

TM 5-4120-288-15

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

RETURN TO CUSTODIAN

OPERATOR, ORGANIZATIONAL, DIRECT AND  
GENERAL SUPPORT AND DEPOT  
MAINTENANCE MANUAL

AIR CONDITIONER FLOOR MOUNTING;  
AIR COOLED, 6 HP; AC 208/416 V, 3 PHASE  
60 CYCLE, 60,000 BTU (KECO MODEL F-60)  
FSN 4120-926-1159

This copy is a reprint which includes current  
pages from Changes 1, 3, and 4.

HEADQUARTERS, DEPARTMENT OF THE ARMY  
DECEMBER 1967

CHANGE  
No. 1 }  
1

HEADQUARTERS  
DEPARTMENT OF THE ARMY  
WASHINGTON, D. C., 26 April 1968

**Operator, Organizational, Direct and General Support  
Depot Maintenance Manual**

**AIR CONDITIONER FLOOR MOUNTING; AIR COOLED, 6 HP; AC 208/416 V,  
3 PHASE 60 CYCLE, 60,000 BTU (KECO MODEL F-60) FSN 4120-926-1159**

TM 5-4120-288-15, 8 December 1967 is changed as follows:

*Page 1-3.* Figure 1-1. Callout "Temperature Transmitter Valve Element" is changed to read "Sensing Element".

*Page 2-6.* Paragraph 2-6a. In line 1 "leaks" is changed to read "leads".

Paragraph 2-7a. Fifth sentence is changed as follows:

It will also be necessary to close the receiver outlet valve and pump the system's refrigerant into the receiver. The receiver inlet valve is then closed, isolating the refrigerant in the receiver. The compressor suction and discharge valves are then closed.

*Page 3-38.* Figure 3-25. Change "circuit breaker" to read "Starter, Motor".

*Page 6-1.* Paragraph 6-2b(1). In line 1, "froth" is changed to read "foam and bubbles".

Paragraph 6-3b(1). In line 1, "fig. 2-2A" is changed to read "fig. 2-4 ① A."

Paragraph 6-3b(5) is superseded as follows:

(5) Open suction valve 1/4 turn so gage will register.

*Page 6-4.* Paragraph 6-4a(4) is superseded as follows:

(4) Open service tank valve and front seat the discharge service valve, and close the gage valve on the vacuum gage.

Paragraph 6-4a(6) is superseded as follows:

(6) Close service tank valve, back seat both discharge and suction service valves, remove manifold hoses and adapters from the suction and discharge service valves and install service valve port plugs.

*Page 6-32.* Paragraph 6-32, Sentence 4 is changed as follows:

The low pressure gas from the evaporator passes through the manually operated suction service valve into the compressor. The low pressure gas is compressed to a high temperature gas and discharged through the discharge service valve and hot gas tube into the condenser.

*Page 6-33.* Paragraph 6-36. Sentence 1 is changed as follows:

The hot compressed gas from the compressor is passed through the discharge valve and hot gas tube into the condenser.

*Page 6-39.* Paragraph 6-52. Sentence 2 is changed as follows:

The location of the moisture indicator in the refrigeration system is shown in figure

## **SAFETY PRECAUTIONS**

### **BEFORE OPERATION**

Always disconnect the power supply cable before performing maintenance.

Avoid bodily contact with the refrigerant (R-12).

In case of refrigerant leakage do not inhale the refrigerant or allow it to contact the eyes. If exposed, immediately get into the fresh air and inhale. Wash the eyes with fresh water.

When testing for gas leaks with a halide torch be sure the area is well ventilated. When the torch flame comes in contact with the refrigerant, phosgene gas is released. Phosgene gas has the odor of new mown hay, and it can be deadly.

Always open the compressor suction and discharge valves and the receiver inlet and outlet valves before connecting the electrical power supply on the unit.

### **DURING OPERATION**

Avoid bodily contact with the refrigerant (R-12).

In case of refrigerant leakage do not inhale refrigerant or allow it to contact the eyes. If exposed, immediately get into the fresh air and inhale. Wash the eyes with fresh water.

When testing for refrigerant leaks with a halide torch be sure the area is well ventilated. When the torch flame comes in contact with refrigerant, phosgene gas is released. Phosgene has the odor of new mown hay, and it can be deadly.

Always test-operate the air conditioner with all panels installed.

Use extreme caution when testing or adjusting the electrical circuit components when the power supply is connected. Both the 208/416-volt current used can cause injury or death.

### **AFTER OPERATION**

Always stop the air conditioner and disconnect the power supply cable before servicing or performing required maintenance.

During maintenance to the compressor do not handle any oil-refrigerant mixture or sludge with the bare hands, as it contains hydrochloric and hydrofluoric acid.

CHANGE

No. 1

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HEADQUARTERS  
 DEPARTMENT OF THE ARMY  
 WASHINGTON, D. C., 26 April 1968

**Operator, Organizational, Direct and General Support  
 Depot Maintenance Manual**

**AIR CONDITIONER FLOOR MOUNTING; AIR COOLED, 6 HP; AC 208/416 V,  
 3 PHASE 60 CYCLE, 60,000 BTU (KECO MODEL F-60) FSN 4120-926-1159**

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It will also be necessary to close the receiver outlet valve and pump the system's refrigerant into the receiver. The receiver inlet valve is then closed, isolating the refrigerant in the receiver. The compressor suction and discharge valves are then closed.

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*Page 6-1.* Paragraph 6-2b(1). In line 1, "froth" is changed to read "foam and bubbles".

Paragraph 6-3b(1). In line 1, "fig. 2-2A" is changed to read "fig. 2-4 ① A."

Paragraph 6-3b(5) is superseded as follows:

(5) Open suction valve 1/4 turn so gage will register.

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(4) Open service tank valve and front seat the discharge service valve, and close the gage valve on the vacuum gage.

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The hot compressed gas from the compressor is passed through the discharge valve and hot gas tube into the condenser.

*Page 6-39.* Paragraph 6-52. Sentence 2 is changed as follows:

The location of the moisture indicator in the refrigeration system is shown in figure

Change }  
No. 3 }

HEADQUARTERS  
DEPARTMENT OF THE ARMY  
Washington, D.C., 6 March 1978

**Operator, Organizational, Direct and General  
Support and Depot Maintenance Manual**  
**AIR CONDITIONER, FLOOR MOUNTING; AIR COOLED,**  
**6 HP, AC, 208/416 V, 3 PHASE, 60 CYCLE,**  
**60,000 BTU (KECO MODEL F-60)**  
**FSN 4120-926-1159**

TM 5-4120-288-15, 8 December 1967, is changed as follows:

*Page 1-1.* Paragraph 1-1 is superseded as follows:

**1-1. Scope**

- a.* This manual is for your use in operating and maintaining the air conditioner (Keco Model F-60).
- b.* You can improve this manual by calling attention to errors and by recommending improvements using DA Form 2028 (Recommended Changes to Publications), or by letter, and mail directly to Commander, U.S. Army Mobility Equipment Command,

ATTN: AMSME-MPP, 4300 Goodfellow Boulevard, St. Louis, Mo. 63120. A reply will be furnished directly to you.

*Page 1-1.* Paragraph 1-2 is superseded as follows:

**1-2. Maintenance Forms and Records**

Maintenance forms and records that you are required to use are explained in TM 38-750.

*Page B-1.* Appendix B is superseded as follows:

**APPENDIX B**  
**BASIC ISSUE ITEM LIST AND ITEMS**  
**TROOP INSTALLED OR AUTHORIZED**

**Section I. INTRODUCTION**

**B-1. Scope**

This appendix lists basic issue items, items troop installed or authorized which accompany the air conditioner and are required by the crew/operator for operation, installation, or operator's maintenance.

**B-2. General**

This basic issue items, items troop installed or authorized list is divided into the following sections:

- a. Basic Issue Items List—Section II.* Not applicable.

*b. Items Troop Installed or Authorized List—Section III.* A list in alphabetical sequence of items which at the discretion of the unit commander may accompany the end item, but are NOT subject to be turned in with the end item.

**B-3. Explanation of Columns**

The following provides an explanation of columns in the tabular list of Basic Issue Items List, Section II, and Items Troop Installed or Authorized, Section III.

- a. Source, Maintenance, and Recoverability Code(s) (SMR):* Not applicable.

\*This change supersedes Change 2, 8 May 1969.

6-22.

Page 6-45 Paragraph 6-69a. In line 1 (fig. 6-27) is changed to read (fig. 6-28)

Page 6-60. Figure 6-35. Change "Safety rupture disk" to read "Fusible plug".

Paragraph 6-102. Title "Safety Rupture

Disk" is changed to read "Fusible Plug."

Paragraph 6-103. Title "Safety Rupture Disk" is changed to read "Fusible Plug".

Paragraph 6-104. Title "Safety Rupture Disk" is changed to read "Fusible Plug".

By Order of the Secretary of the Army:

Official:

KENNETH G. WICKHAM,  
*Major General, United States Army,*  
*The Adjutant General.*

HAROLD K. JOHNSON,  
*General, United States Army,*  
*Chief of Staff.*

Distribution:

To be distributed in accordance with DA Form 12-25, Section III requirements for Organizational maintenance, Air Conditioners, 60,000 BTU.

CHANGE  
No. 4

HEADQUARTERS  
DEPARTMENT OF THE ARMY  
WASHINGTON, DC, 14 March 1975

**Operator, Organizational, Direct Support,  
General Support and Depot Maintenance Manual**

**AIR CONDITIONER, FLOOR MOUNTING, AIR COOLED, 6 HP,  
AC, 208/416 VOLT, 3 PHASE, 60 CYCLE, 60,000 BTU,  
KECO MODEL F-60  
NSN 4120-00-926-1159**

TM 5-4120-288-15, 8 December 1967, is changed as follows:

The title is changed as shown above.

*Page 2 of cover.* Add the following warning to the list of safety precautions.

**WARNING**

The burning of polyurethane foams is dangerous. Due to the chemical composition of a polyurethane foam, toxic fumes are released when it is burned or heated. If it is burned or heated indoors, such as during a welding operation in its proximity, precautions should be taken to adequately ventilate the area. An exhaust system equivalent to that of a paint spray booth should be used. Air supplied respirators, approved by the National Institute for Occupational Safety and Health or the US Bureau of Mines, should be used for all welding in confined spaces and when ventilation is inadequate. Individuals who have chronic or recurrent respiratory conditions, including allergies and asthma, should not be employed in this type of environment.

*b. Federal Stock Number.* This column indicates the Federal stock number assigned to the item and will be used for requisitioning purposes.

*c. Description.* This column indicates the Federal item name and any additional description of the item required.

*d. Unit of Measure (U/M).* A 2-character alphabetic abbreviation indicating the amount or quantity of the item upon which the allowances are based, e.g., ft, ea, pr, etc.

*e. Quantity Authorized (Items Troop Installed or Authorized Only).* This column indicates the quantity of the item authorized to be used with the equipment.

### Section III. ITEMS TROOP INSTALLED OR AUTHORIZED LIST

| (1)<br>SMR<br>code | (2)<br>Federal stock<br>number | (3)<br>Ref No. & Mfr<br>code | (3)<br>Description | (4)<br>Usable<br>on code | (4)<br>Unit<br>of<br>meas | (5)<br>Qty auth |
|--------------------|--------------------------------|------------------------------|--------------------|--------------------------|---------------------------|-----------------|
|                    | 7520-559-9618                  |                              | CASE, MANUAL       |                          | EA                        | 1               |

By Order of the Secretary of the Army:

Official:

VERNE L. BOWERS

*Major General, United States Army  
The Adjutant General*

CREIGHTON W. ABRAMS  
*General, United States Army  
Chief of Staff*

Distribution:

To be distributed in accordance with DA Form 12-25C (qty rqr block No. 574) Organizational Maintenance requirements for Air Conditioners, 60,000 BTU.

By Order of the Secretary of the Army:

FRED C. WEYAND  
*General, United States Army*  
*Chief of Staff*

Official:

VERNE L. BOWERS  
*Major General, United States Army*  
*The Adjutant General*

Distribution:

To be distributed in accordance with DA Form 12-25C, (qty rqr block No. 574). Organizational maintenance requirements for Environmental Equipment: Air Conditioners, 60,000 BTU.

★U.S. GOVERNMENT PRINTING OFFICE: 1975-665140/786

TECHNICAL MANUAL }  
No. 5-4120-288-15 }

HEADQUARTERS  
DEPARTMENT OF THE ARMY  
WASHINGTON, D.C., 8 December 1967

**Operator, Organizational, Direct and General  
Support and Depot Maintenance Manual**

**AIR CONDITIONER FLOOR MOUNTING;  
AIR COOLED, 6 HP; AC 208/416 V, 3 PHASE  
60 CYCLE; 60,000 BTU (KECO MODEL F-60)**

**FSN 4120-926-1159**

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## CHAPTER 1

### INTRODUCTION

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#### Section I. GENERAL

##### 1-1. Scope

a. These instructions are published for the use of the personnel to whom the Keco Industries, Inc., Model F-60 air conditioner is issued. Chapters 1 through 3 provide information on the operation, preventive maintenance services, and organizational maintenance of the equipment, accessories, components, and attachments. Chapter 4 provides information on shipment and limited storage and demolition to prevent enemy use. Chapters 5 and 6 provide information for direct and general support and depot maintenance. Also included are descriptions of main units and their functions in relationship to other components.

b. Appendix A contains a list of publications applicable to this manual. Appendix B contains the list of basic issue items authorized the operator of this equipment and the list of maintenance and operating supplies required for initial operation. Appendix C contains the maintenance allocation chart. Organizational, direct and general support, and depot maintenance repair parts and special tools are listed in TM 5-4120-288-25P.

c. Numbers in parentheses following nomenclature callouts on illustrations indicate quantity; numbers preceding nomenclature callouts indicate the preferred sequence.

d. Report of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to DA Publications) and forwarded direct to the Commanding General, U.S. Army Mobility Equipment Command, ATTN: AMSME-MPP, 4300 Goodfellow Blvd., St. Louis, Mo. 63120.

e. Report all equipment improvement recommendations as prescribed by TM 38-750.

##### 1-2. Forms and Records

a. DA Form 2258 (Depreservation Guide of Engineer Equipment).

b. For other record and report forms applicable to operator, crew and organizational maintenance, refer to TM 38-750.

*Note.* Applicable forms, excluding Standard Form 46 which is carried by the operator, shall be kept in a canvas bag mounted on the equipment.

#### Section II. DESCRIPTION AND DATA

##### 1-3. Description

a. *General.* The Keco Industries Model F-60 Air Conditioner (figs. 1-1 and 1-2) is a self-contained, electric motor driven, air-cooled, conventional type with removable panels. It consists essentially of an electric motor driven compressor, air-cooled condenser, motor driven condenser fans, receiver, evaporator and motor

driven evaporator fan. It also has a fresh air control, air filter, heavy duty head and suction shut-off valves, moisture indicator, and an electrical control system including a remote control panel. The lower compressor and condenser area is provided with removable panels and grille. The side panels fastener spacing will allow panels to be removed and refastened

with top of the panels extending above top of the air conditioner, permitting servicing of the refrigerant equipment while evaporator fan is in operation. When ambient air temperature is 125° F. the air conditioner will maintain a constant conditioned air temperature of 70°-76° F. Fresh air can be added to air that passes through evaporator coil by opening the outside air damper, in one of the two open positions provided, or the filter panel cover can be opened and the evaporator fan will draw fresh outside air.

*b. Condenser Fan Housings and Fan Motors.*

Two condenser fan motor and housing assemblies are located behind the condenser grille assembly at the rear of the air conditioner. A separate toggle switch controls the motors manually and a condenser section thermostat controls the fans automatically when the outside air is too cool. An automatic refrigeration discharge pressure control system is provided by use of a two-step pressure controller actuating one of the two condenser fans for low ambient operation. The system also incorporates other control instruments that control the condenser fan motor operation with the electrical system, interlocked with the refrigerant system.

*c. Evaporator Fan, Housing, and Motor.* The evaporator fan is driven by two drive belts that fit an adjustable sheave on the fan motor shaft and a sheave on the fan wheel of the evaporator housing. The tension on the drive belts is adjusted by moving the drive motor base on which drive motor is mounted. The evaporator fan forces conditioned air, after it has been drawn through the evaporator coil and cooled, out the air outlet that is connected to the ducts for the area to receive the cool air. A small amount of fresh outside air can be added to the air returning through the inlet duct connection before passing through the evaporator coil. When a greater quantity of fresh outside air is desired, the filter panel cover is opened to add fresh air to the circulating air.

*d. Compressor Assembly.* The compressor assembly is a semi-hermetically sealed six-cylinder unit. It is driven by an eccentric shaft coupled to the electric motor shaft in the same housing. A built in rotor-type oil pump

in the compressor body provides positive lubrication to all internal parts. Oil added with refrigerant lubricates the compressor valves. A six-horse power electric motor in the housing drives the compressor and operates on either 208 volts or 416 volts, 3 phase, 50 or 60 cycle.

#### 1-4. Identification and Tabulated Data

*a. Identification.* The Keco Model F-60 Air Conditioner has nine identification plates. The information contained on the plates is listed below.

- (1) *Corps of Engineers Plate.* Located on the rear of the air conditioner on the cross plate of the welded frame assembly near the left edge between the condenser section screen and the condenser fan grille.
- (2) *Compressor valves and power information: Caution Plate.* Located on the rear of the air conditioner on the cross plate of the welded frame assembly, near the right edge between the condenser section screen and the condenser fan grille.
- (3) *Condenser Switch Instruction Plates.* Located on the rear of the air conditioner on the cross plate of the welded frame assembly between the condenser section screen and the condenser fan grille.
- (4) *Remote Wiring Instruction Plate.* Located on the rear of the air conditioner on the filter panel assembly below the adjustable outside air damper on the panel.
- (5) *Reset Button Instruction Plate.* Located on the rear of the air conditioner on the filter panel assembly below the adjustable outside air damper on the panel.
- (6) *Wiring Schematic Instruction Plate.* Located on the rear of the air conditioner secured on the adjustable outside air damper.
- (7) *Refrigerant Identification Plate.* Located on the rear of the compressor stating that  $\text{CCL}_2\text{F}_2$  (R-12) is the refrigerant used with this unit.

## b. Tabulated Data.

### (1) Air Conditioner.

Manufacturer --- Keco Industries, Inc.  
Model --- F-60  
Cooling Capacity 60,000 BTU H from 60° per hour --- to 125° F. ambient air temperature, unit maintains 70° F. to 76° F.  
Size --- 5 tons  
Cycle --- 60/50  
Phase --- 3  
Voltage --- 208/416 V  
Type --- Self-contained with remote control panel

### (2) Compressor Assembly.

Make --- Carrier Air Conditioning Company  
Model --- 6D63-119-8  
Type --- Semi-hermetically Sealed Shell  
Cylinders --- 6  
Bore --- 2 in.  
Lubrication --- Forced  
Speed --- 1750 rpm  
Service Discharge  
    Valve ---  $\frac{1}{8}$  in. ODF  
Service Suction  
    Valve ---  $1\frac{1}{8}$  in. ODF  
Cycle --- 60/50  
Phase --- 3  
Voltage --- 208/416 V  
Full Load Amperage --- 30/15  
Horsepower --- 6  
Minimum Operating Voltage at Motor Terminal --- 195 V  
Refrigerant --- CCL<sub>2</sub>F<sub>3</sub> (R-12)

### (3) Condenser Fan Motors.

Manufacturer --- General Electric Co.  
Type --- K  
Voltage --- 208/416 V  
Cycle --- 60/50  
Code --- J  
Horsepower ---  $\frac{3}{4}$   
Phase --- 3  
Frame --- 56  
Speed --- 3,450 rpm  
Rotation from  
    Shaft end --- Clockwise  
Full load amperage --- 2.8/1.4  
Quantity --- 2

### (4) Evaporator Fan Motor.

Manufacturer --- Louis Allis Co.  
Model --- R861  
Type --- CJ1  
Voltage --- 208/416 V  
Cycle --- 60/50

Code --- K  
Phase --- 3  
Frame --- 184  
Speed --- 1,730 rpm  
Rotation from  
    Shaft end --- Counterclockwise  
Full load amperage --- 5.8/2.9  
Horsepower --- 2  
Operation --- Evaporator fan delivers 1,800 cfm at 1.5 in. water static pressure

### (5) Air Filter.

Manufacturer --- Farr Company  
Model --- Farr-Air Filter  
Size --- 28 x 14 x 1 inches  
Air Flow --- Either Direction

### (6) Shipping Dimensions and Weight (fig. 1-1).

Length --- 32 inches  
Width --- 33  $\frac{1}{2}$  inches  
Height --- 68  $\frac{1}{4}$  inches  
Weight --- 1,150 lbs.

### (7) Capacities.

Refrigerant --- 30 lbs. of R-12 (dichlorodifluoromethane)  
Compressor Oil --- 5 qt. (quarts)

### (8) Physical Properties of Compressor Crankcase Oil.

Viscosity at 100° F.-SSU --- 150  $\pm$  10 Sec.  
Dielectric-Minimum --- 25 KV  
Flock Point-  
    Maximum --- -70° F.  
Pour point-  
    Maximum --- -35° F.  
Neutralization  
    No.-Maximum --- 0.05° F.  
Flash point-  
    Minimum --- 330° F.

### (9) Nut and Bolt Torque Data for Compressor Bolts.

|                   |                            |
|-------------------|----------------------------|
| $\frac{1}{4}$ -20 | 6-10 ft.-lb. (foot pounds) |
| 5/16-18           | 18-22 ft.-lb.              |
| 5/16-24           | 28-30 ft.-lb.              |
| $\frac{3}{8}$ -16 | 30-35 ft.-lb.              |
| 7/16-20           | 42-47 ft.-lb.              |
| 7/16-14           | 45-50 ft.-lb.              |
| $\frac{1}{2}$ -18 | 50-60 ft.-lb.              |
| $\frac{5}{8}$ -18 | 100-120 ft.-lb.            |

### (10) Base Plan (fig. 1-3).

### (11) Wiring Diagram (fig. 1-4).

### (12) Wiring Conversion Diagram (fig. 2-2).

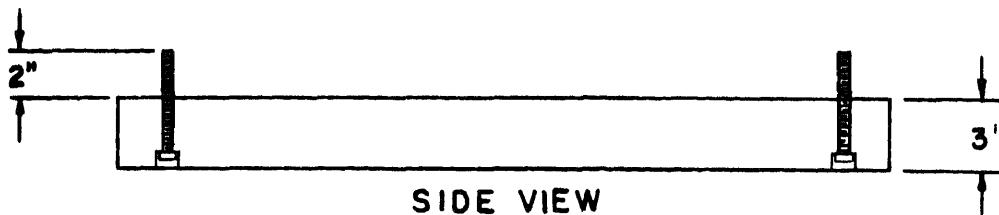
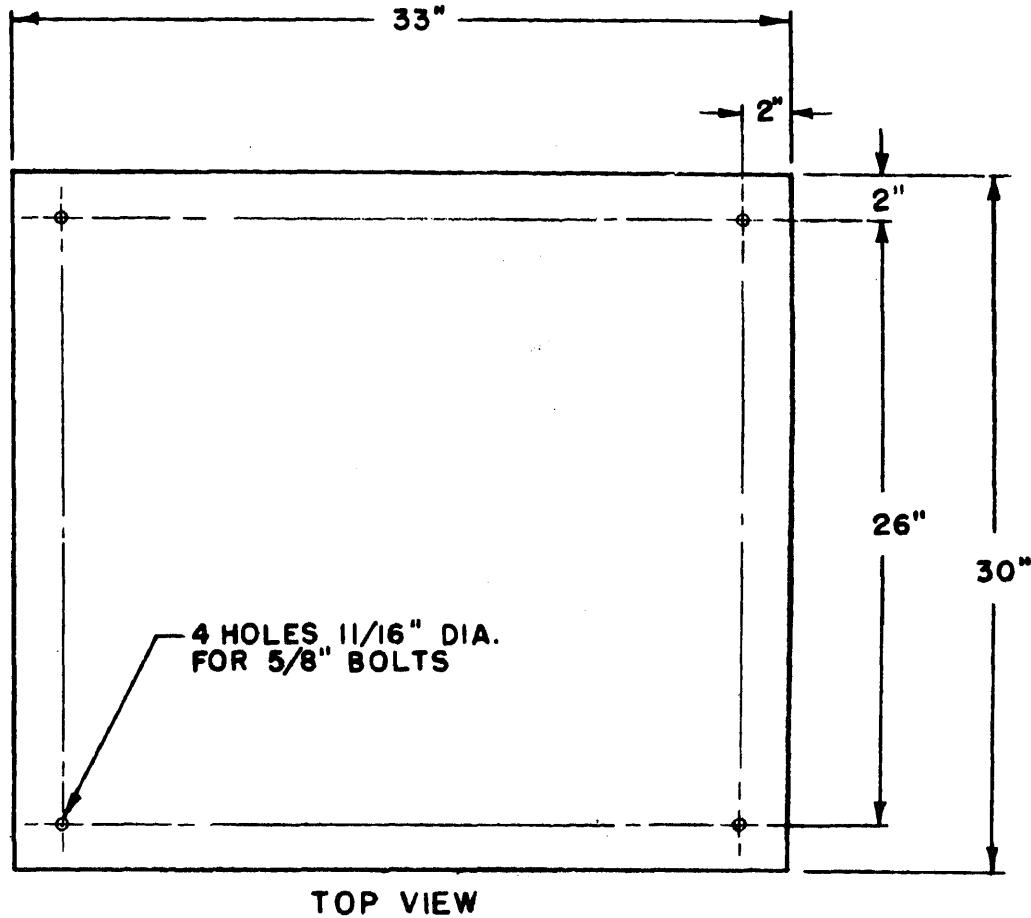
### (13) Dimensions for Duct Connections (fig. 1-5).

### (14) Refrigerant Flow Diagram (fig. 1-6).

## 1-5. Difference in Models

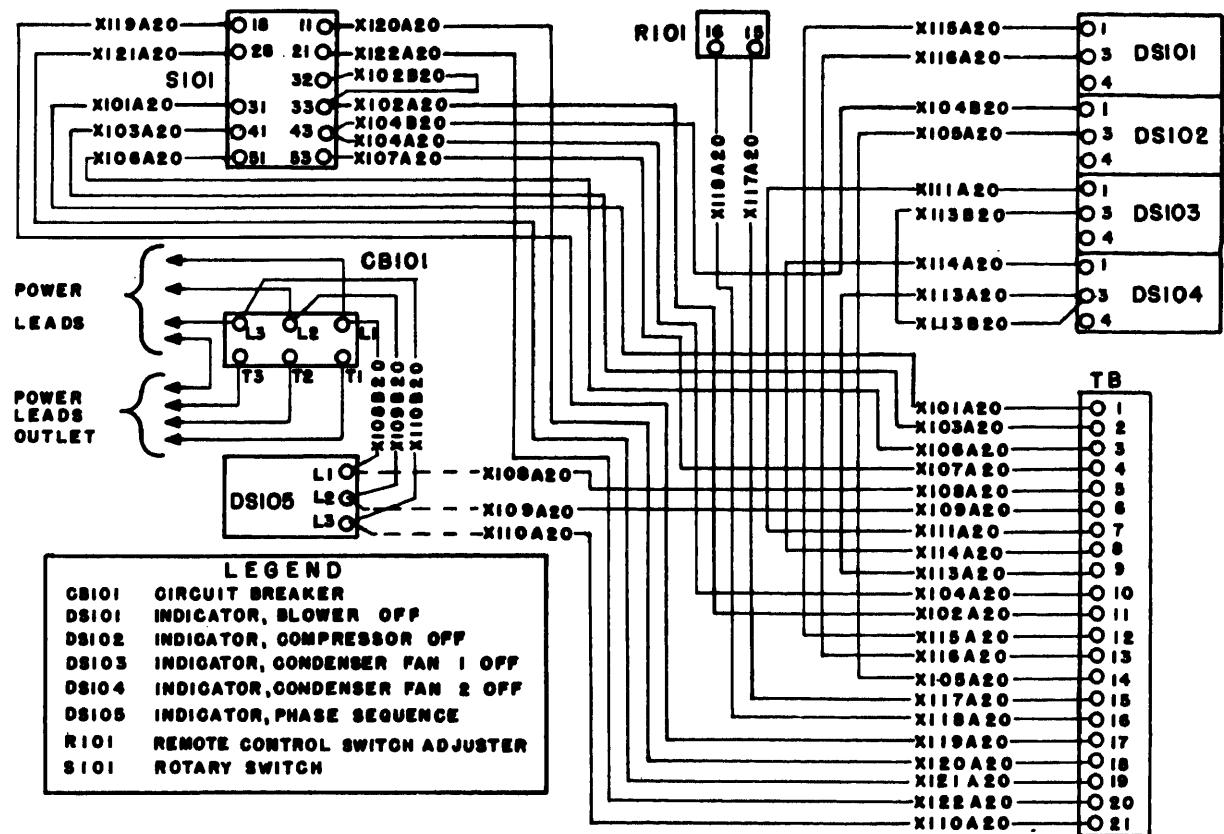
This manual covers only the Keco Air Conditioner Model F-60. No known unit differ-

ences exist for the model covered by this manual.



4120-288-15/1-3

Figure 1-3. Base plan.



A

4120-288-15/1-4 ①

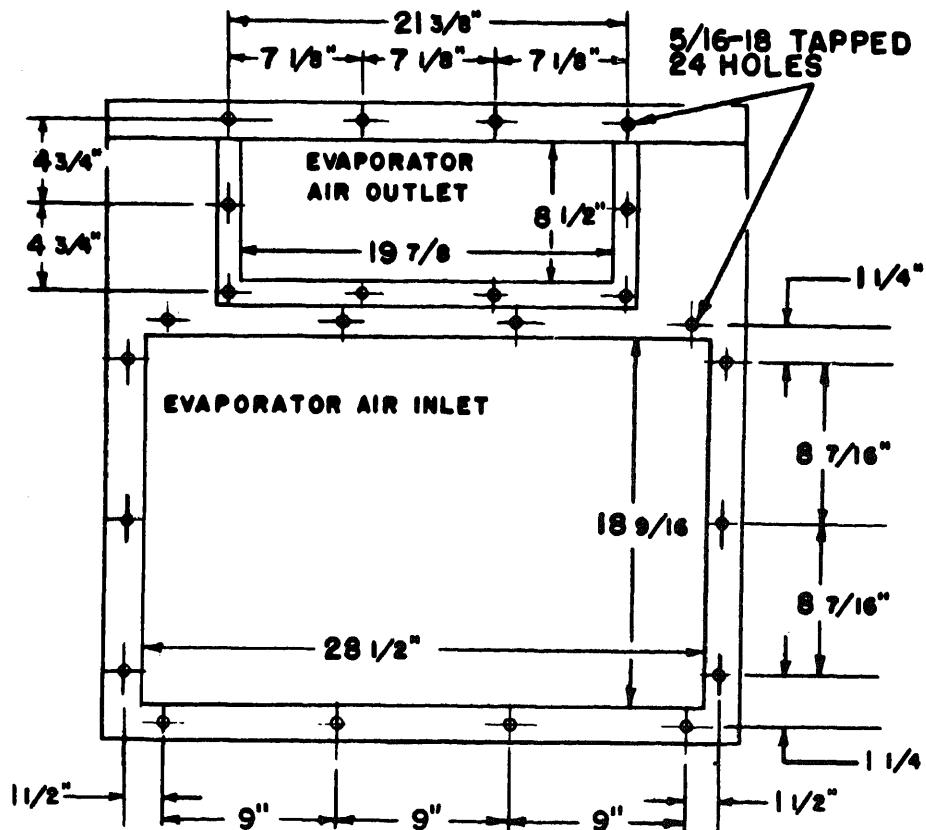
#### A. Remote control panel.

Figure 1-4 ①. Wiring diagram for remote control panel.

*B. 416 volt.*

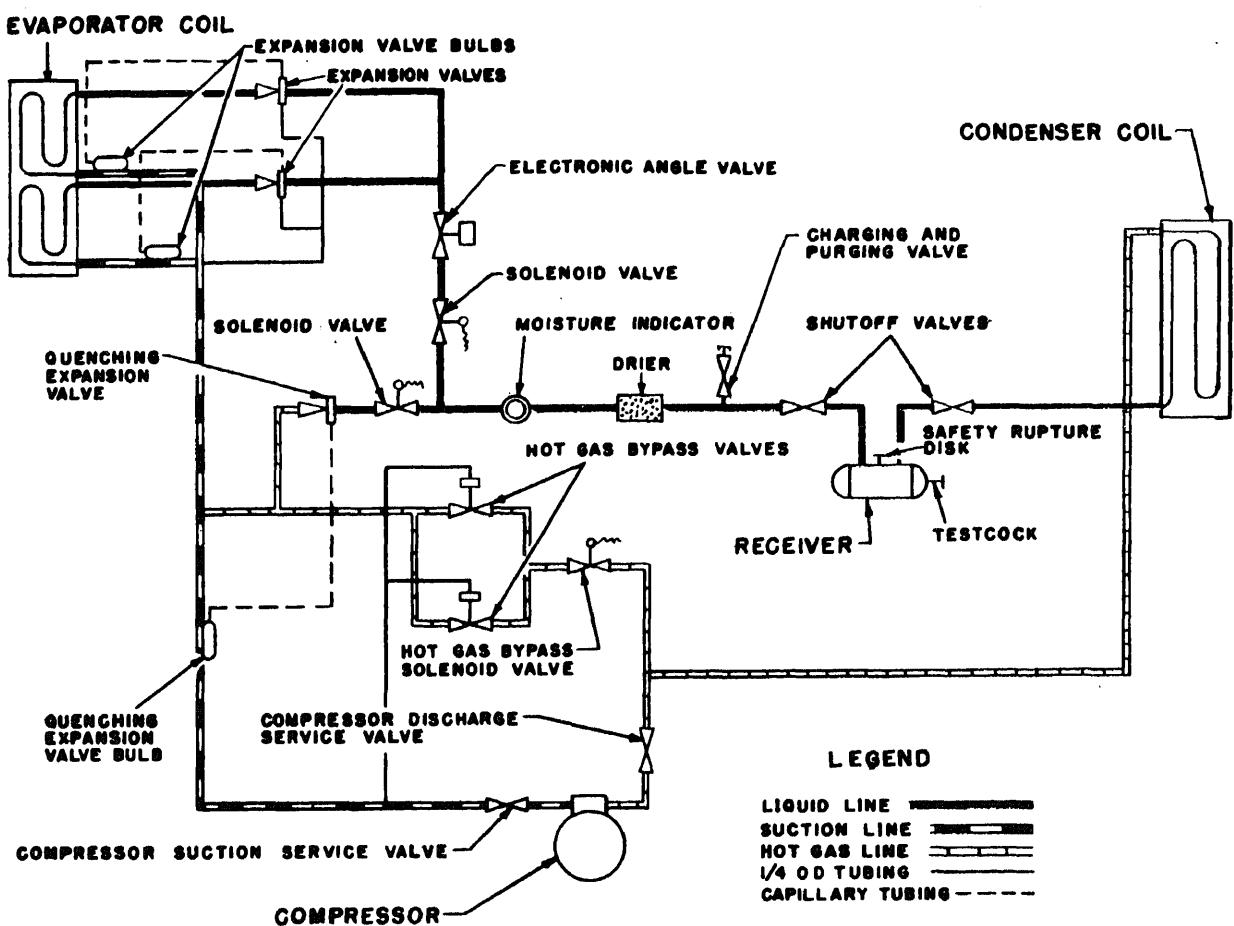
Figure 1-4 ②. Wiring diagram for remote control panel.

Located in back of manual



4120-288-15/1-5

Figure 1-5. Dimensions for duct connections.



4120-288-15/1-6

Figure 1-6. Refrigerant flow diagram.



## CHAPTER 2

### INSTALLATION AND OPERATION INSTRUCTIONS

---

#### Section I. SERVICE UPON RECEIPT OF EQUIPMENT

##### 2-1. Inspecting and Servicing the Air Conditioner

- a. Perform all preventive maintenance services (para 3-6 and 3-7).
- b. Inspect each side panel, condenser screen assembly, condenser grille assembly, and canvas covers for damage that may have occurred in shipment.
- c. Remove the side panels (para 3-29), and inspect for frayed or damaged wires, damaged tubing, or other signs of damage.
- d. Inspect the separately packed remote control panel and cables for damage.
- e. Correct or report any loss or damage to direct support maintenance.

##### 2-2. Installation of Separately Packed Components

The air conditioner is a self-contained unit and is received ready for installation. The separately packed components are the remote control panel and cables that are designed for the area that is to be serviced by this unit. The remote control panel has a wiring harness attached ready for installation. See paragraph 6-17b.

##### 2-3. Installation or Setting Up Instructions

- a. Prepare the base as shown on figure 1-3.
- b. Position the air conditioner on the base by using a suitable lifting device attached to the top of the air conditioner.
- c. Secure the air conditioner to the base as shown on figure 2-1. If possible locate unit so that it will be accessible through the service panels on all sides for easy maintenance.

d. Bolt unit to the floor of the trailer or foundation. The center-line dimensions of the bolts shown in figure 1-3.

e. Connect ducting to the air conditioner.

f. Connect power supply and remote control cables to the air conditioner.

*Caution:* Refer to figure 1-4 and make sure that wiring of air conditioner is for the same voltage as power supply.

g. Connect the condensate drain hose as instructed on figure 2-1.

h. See that all installation adjustments are made and installation procedures accomplished by direct support maintenance.

##### 2-4. Equipment Conversion

The Keco Air Conditioner Model F-60 is a unit designed to operate on either 208 volts or 416 volts with very little changeover required. A transformer must be used for 416 volts, and the motor terminal blocks must be rewired for the correct voltage input to motors. Both the 208 volt and 416 volt power must be 50 or 60 cycle 3 phase current. This air conditioner is generally shipped wired for 208 volts and must be converted for 416 volt operation.

##### 2-5. Wiring Changes for Conversion of Transformer from 208 Volts to 416 Volts

a. Remove side panels (fig. 3-9).

b. Refer to wiring diagram (fig. 1-4) and to wiring conversion diagram (fig. 2-2) and change electrical leads as follows:

- (1) Remove tape on transformer leads and insert them in the control box.

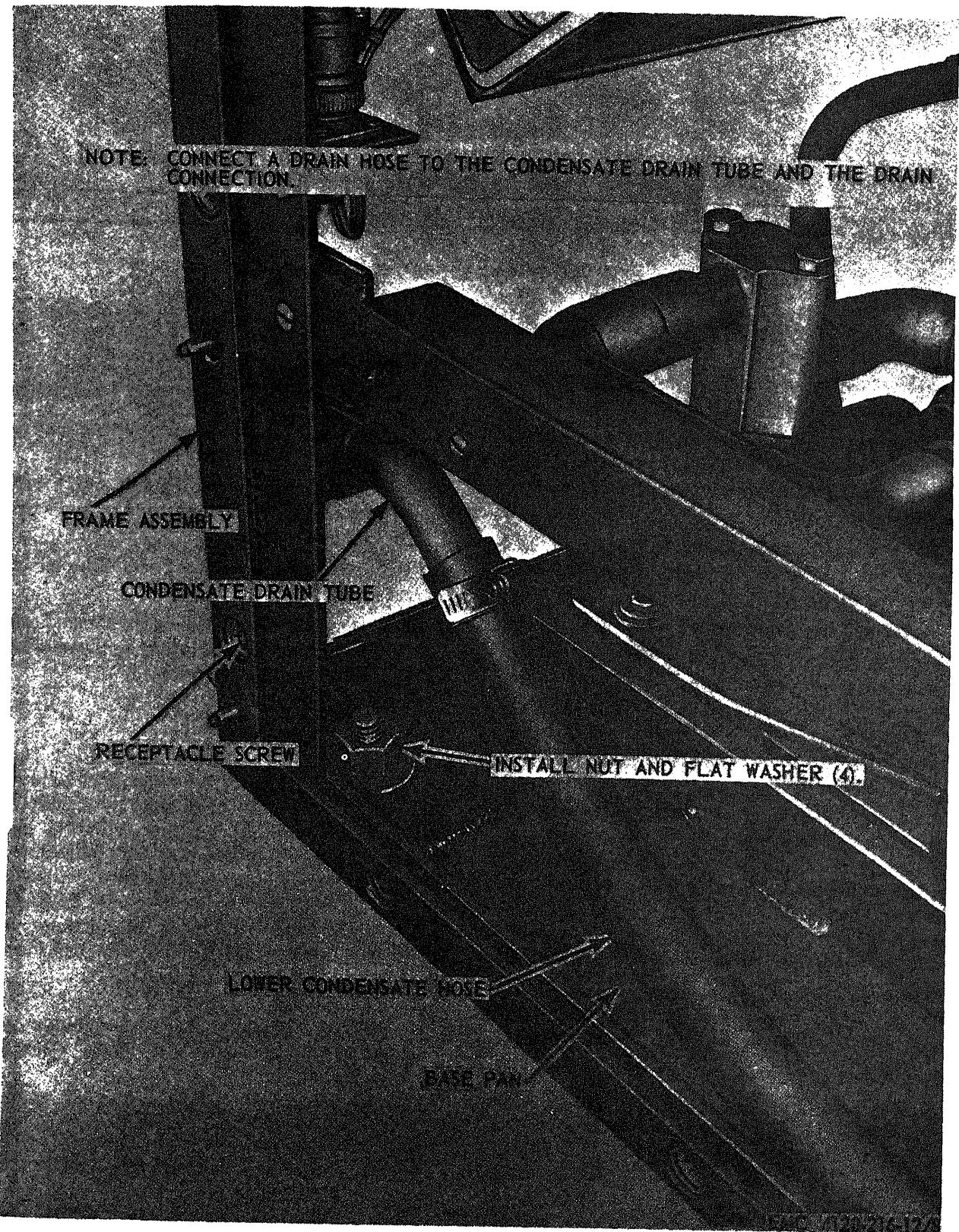
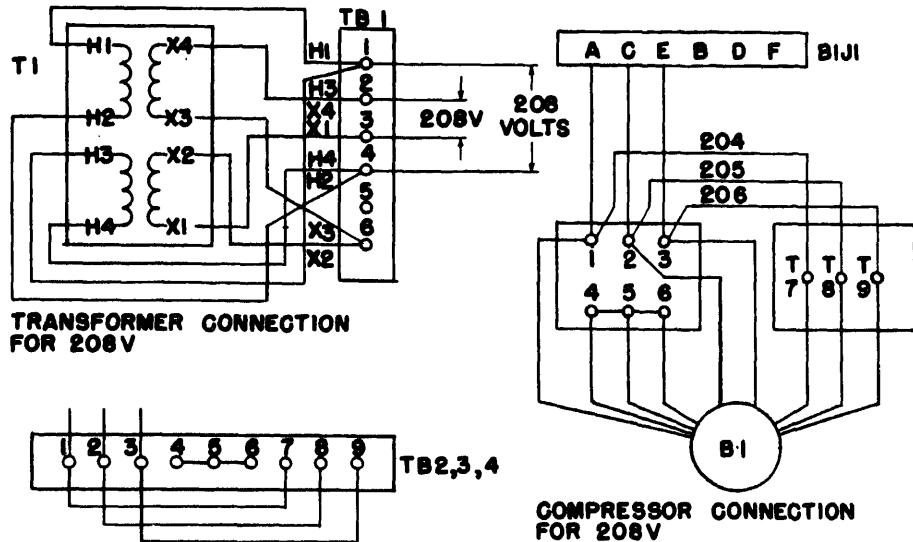
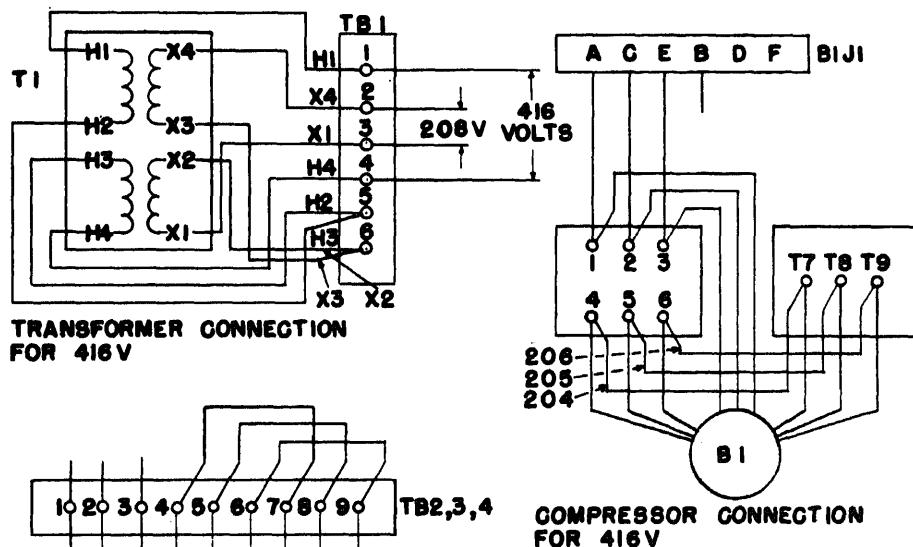


Figure 2-1. Air conditioner installation.



A. MOTOR TERMINAL BLOCK CONNECTION FOR 208 V



B. MOTOR TERMINAL BLOCK CONNECTION FOR 416V

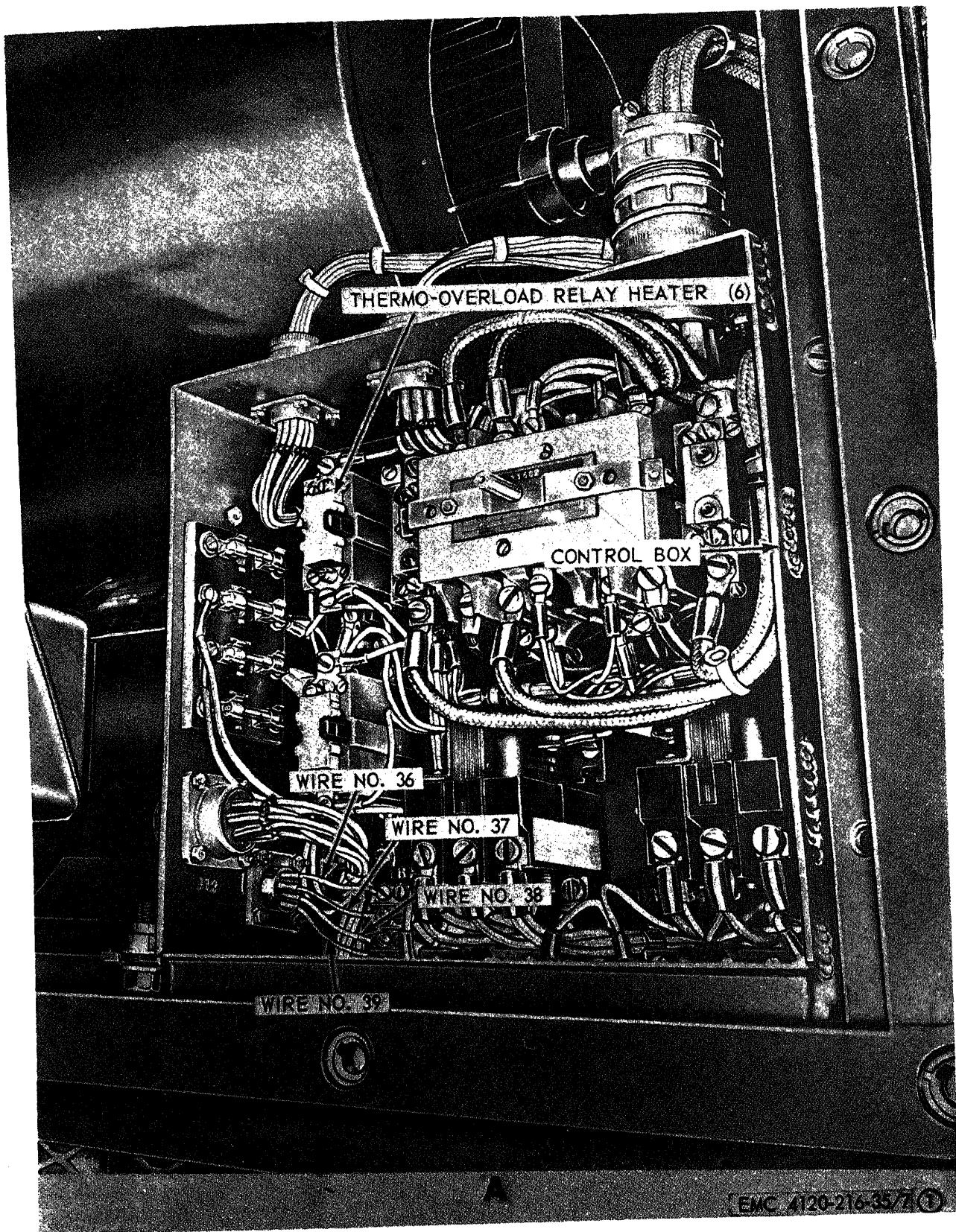
4120-288-15/2-2

A. Motor Terminal Block Connection for 208V.  
 B. Motor Terminal Block Connection for 416V.

Figure 2-2. Wiring conversion diagram.

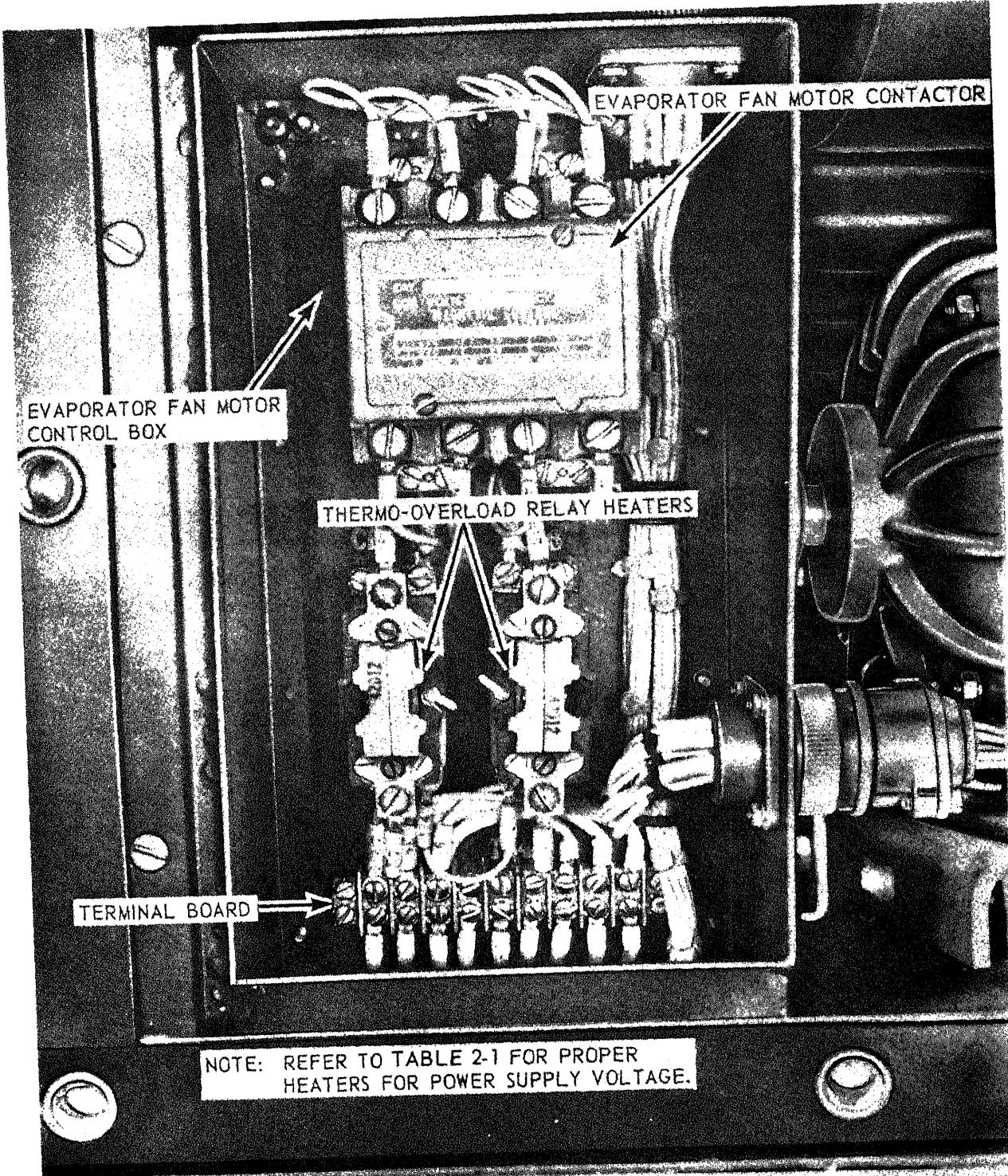
(2) Remove the jumpers on terminal board (TB1) and install transformer leads No. 36, 37, 38, and 39 as illustrated on figure 2-3A.  
 (3) Replace thermal-overload relay heaters as instructed on figure 2-3 and table 2-1.

| Table 2-1. Overload Relay Heater Conversion |         |                  |      |                   |
|---|---------|------------------|------|-------------------|
| Thermal overload relay heater               | Voltage | Number on heater | AMPS | Component used on |
| 1   | 416     | 42418C           | 15.0 | Compressor        |
| 2   | 416     | 42009C           | 8.0  | Evaporator        |
| 3   | 416     | 42008C           | 1.56 | Condenser         |
| 4   | 208     | 42426C           | 30.0 | Compressor        |
| 5   | 208     | 42012            | 6.0  | Evaporator        |
| 6   | 208     | 42009C           | 3.0  | Condenser         |



A. Compressor and condenser fan motor control box.

EMC 4120-216-357 (1)

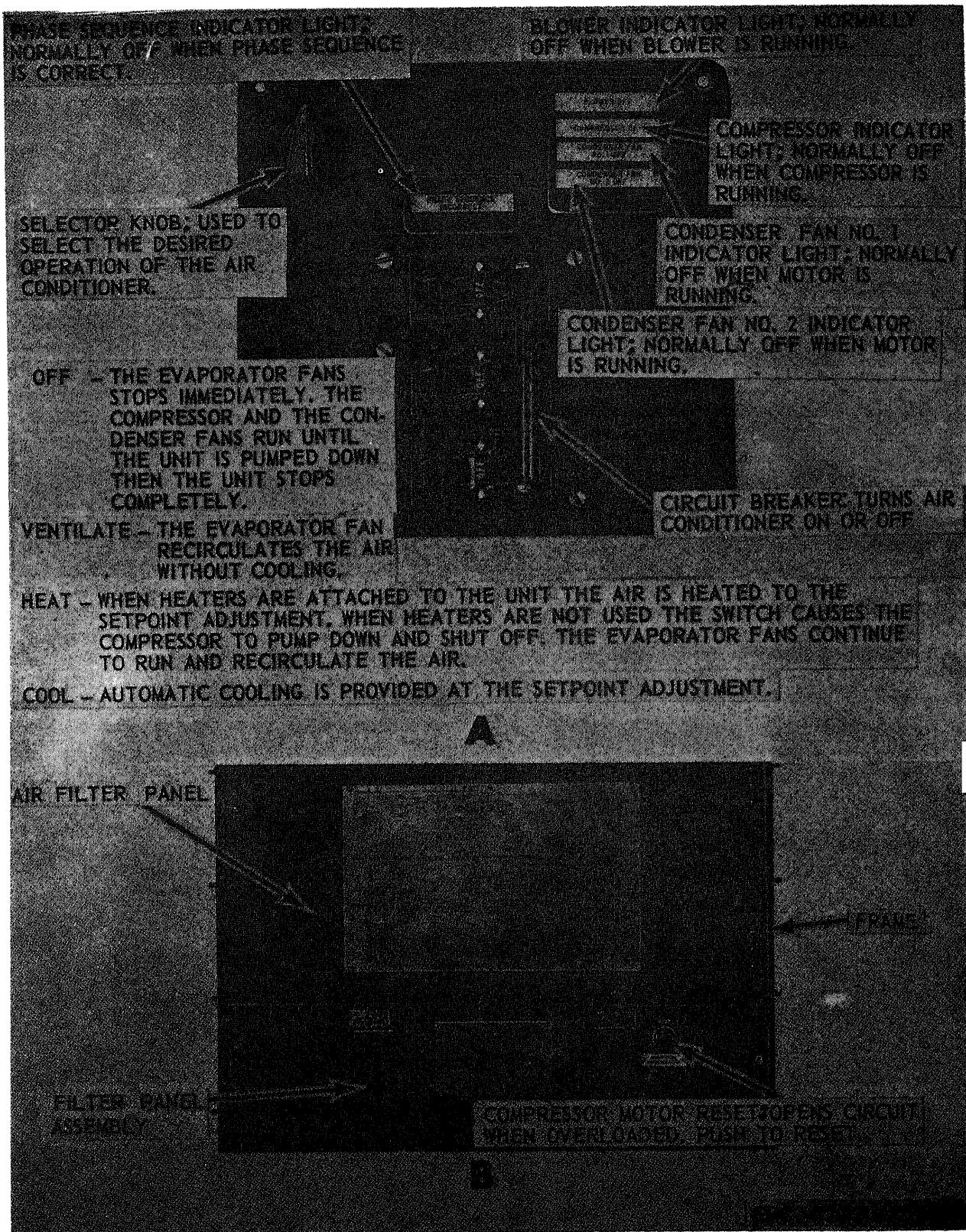


B

MEC 4120-288-15/2-3 (2)

B. Evaporator fan motor control box.

Figure 2-3②.—Continued.



*A. Circuit breaker, selector switch, and indicating lights.*

*B. Compressor motor reset button.*

*Figure 2-4 ① Controls and instruments.*

c. Install side panels (fig. 3-9).

## 2-6. Wiring Changes for Conversion of Motors from 208 Volts to 416 Volts

Refer to figure 1-4, wiring diagram and figure 2-2, wiring conversion diagram and reconnect motor terminal board as follows:

a. Change the leaks on the compressor motor contactor.

b. Change the jumpers on the condenser fan motor terminal board (TB2).

c. Change the jumpers on the condenser fan motor terminal board (TB3).

d. Change jumper wires on the evaporator fan motor terminal board (TB4).

## Section II. MOVEMENT TO A NEW WORKSITE

### 2-7. Dismantling for Movement

a. *Movement to New Worksite.* For a short move, disconnect power and remove power plug. Disconnect water drain piping, remove duct work from evaporator, air outlet and inlet flanges on unit. Remove mounting bolts. For a long move, the above instructions apply. It will also be necessary to close receiver inlet and outlet stop valves as well as compressor suction and discharge service valves. Protect unit with heavy plastic covering. Crate for long move.

*Note.* Label these valves with CAUTION that unit is not to be started unless these valves are open.

b. *Transportation of Unit.* For a short move, the unit may be moved by fork lift truck. For a long move, unit may be moved by fork lift truck to mode of transportation.

### 2-8. Reinstallation After Movement

a. *After a Short Move.* Reinstall ducts, piping and wiring. See figure 1-5. Install mounting bolts per base plan. See figure 1-3.

b. *After a Long Move.* Refer to paragraph 2-3 (INSTALLATION OR SETTING UP INSTRUCTIONS).

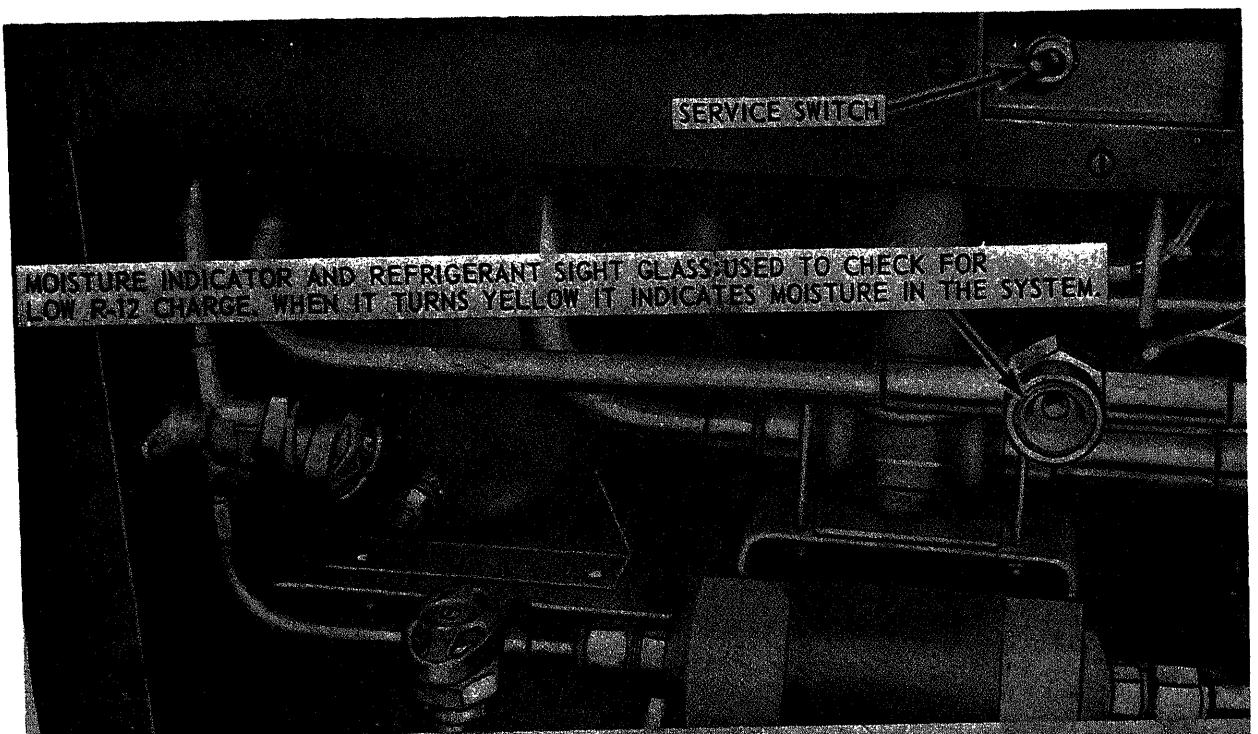
## Section III. CONTROLS AND INSTRUMENTS

### 2-9. General

This section describes, locates, illustrates, and furnishes the operator, crew, or organizational maintenance personnel sufficient information about the various controls and instruments for the proper operation of the air conditioner.

### 2-10. Controls and Instruments

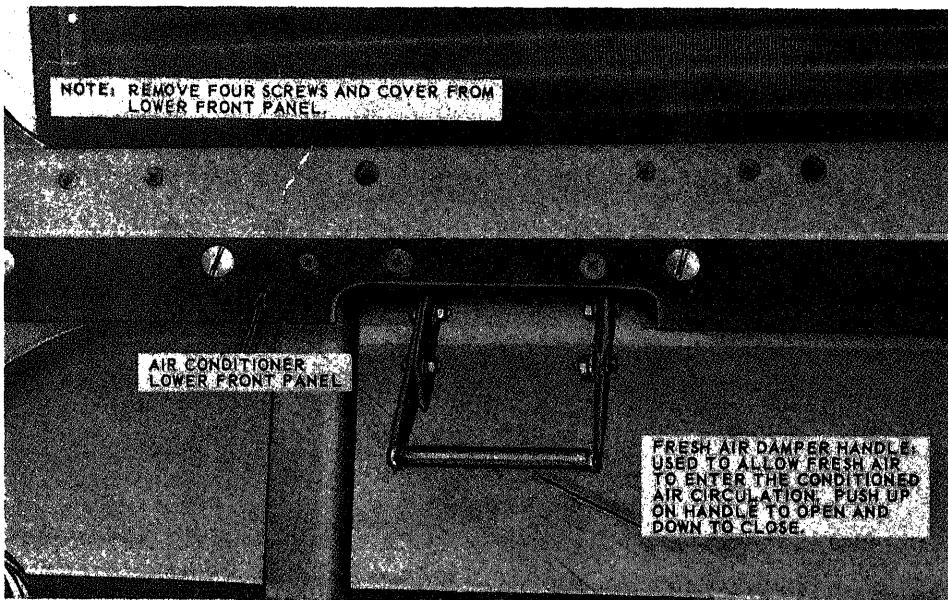
The purpose, location, and use of the controls, and the minimum, normal, and maximum reading of the instruments and controls are illustrated on figure 2-4.



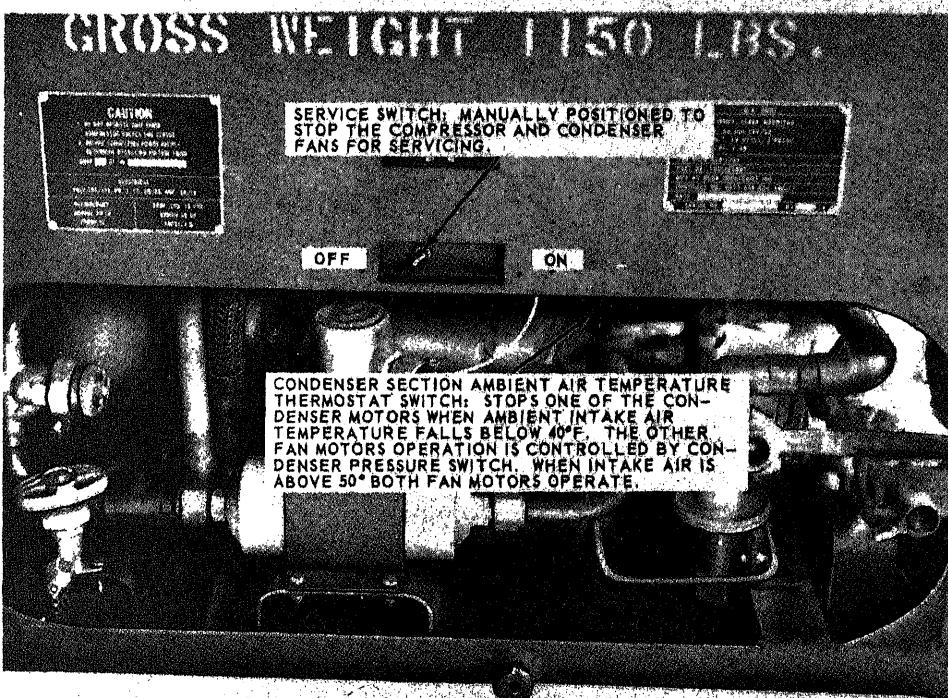
C.. Moisture indicator and refrigerant sight glass.

D. Compressor crankcase sight glass.

Figure 2-4②.—Continued.



E. FRESH AIR DAMPER HANDLE



F. SERVICE SWITCH

4120-400-10-2-4

E. Fresh air damper handle.  
F. Service switch.

Figure 2-4 ③.—Continued.

## Section IV. OPERATION UNDER USUAL CONDITIONS

### 2-11. General

a. Instructions in this section are published for the information and guidance of the personnel responsible for operation of the air conditioner.

b. The operator must know how to perform every operation of which the air conditioner is capable. This section gives instructions on starting and stopping the air conditioner, operation of the air conditioner, and on coordinating basic motions to perform specific task for which the equipment is designed. Since nearly every job presents a different problem, the operator may have to vary given procedures to fit the individual job.

### 2-12. Operating Air Conditioner for Ventilation or Recirculation of Air

#### a. Preparation for Starting.

- (1) Perform daily preventive maintenance services (para 3-6).
- (2) Open fresh air damper illustrated on E, figure 2-4 by positioning handle for the desired opening and allow a small quantity of fresh air to mix with the air circulating in the area receiving the conditioned air.
- (3) Open filter panel to position desired, as instructed on figure 2-5 to admit fresh filtered air into the area receiving the conditioned air.

#### b. Starting.

- (1) Move circuit breaker (A, fig. 2-4) to ON position.
- (2) Position the selector knob on the remote control panel to the VENTILATION position. Operate the air conditioner.

#### c. Stopping.

- (1) Stop the air conditioner by positioning the selector knob to OFF.
- (2) Move circuit breaker to OFF position.
- (3) Close outside air damper.
- (4) Close the filter panel in reverse of the instructions on figure 2-5.

### 2-13. Operating Air Conditioner for Cooling

#### a. Preparation for Starting.

- (1) Perform daily preventive maintenance services (para 3-6).

#### b. Starting.

- (1) Set selector knob (A, fig. 2-4) for COOLING. Operate air conditioner.
- (2) Move circuit breaker to ON position.

#### c. Stopping.

- (1) Stop air conditioner by positioning selector knob to OFF.
- (2) Move circuit breaker to OFF position.

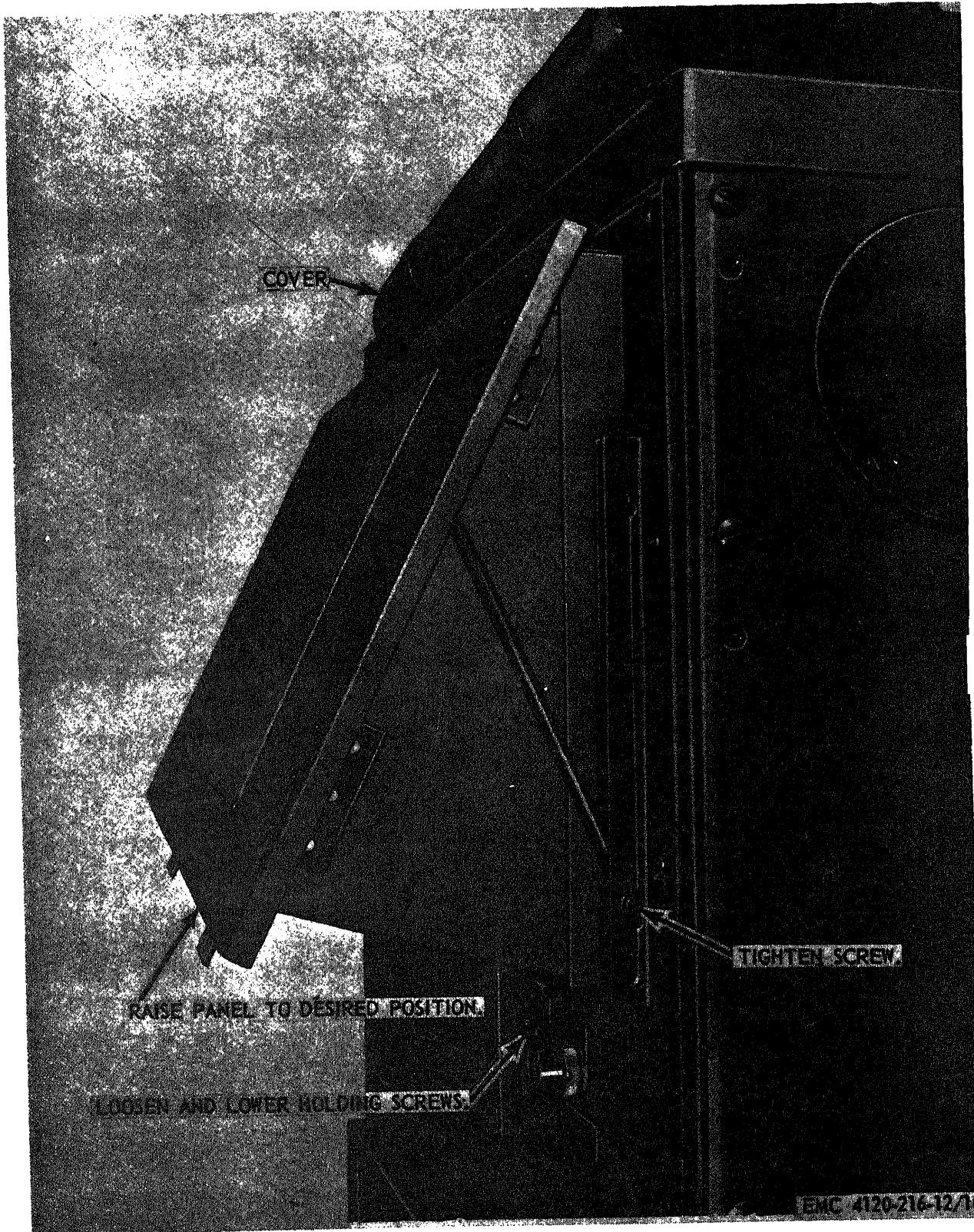


Figure 2-5. Filter panel and cover.

## Section V. OPERATION UNDER UNUSUAL CONDITIONS

### 2-14. Operation in Extreme Heat

a. Perform the daily preventive maintenance services (para 3-6).

b. Erect a temporary structure or a canvas sunshield over air conditioner when in the direct sunlight.

*Note.* Keep a minimum of three feet clearance between the top and sides of air conditioner and the protective structure.

c. Operate as outlined in paragraph 2-13.

### 2-15. Operation in Dusty or Sandy Areas

a. Erect a shield or screen of porous material in front of the condenser screen assembly to filter the outside air.

*Caution:* Do not restrict flow of air with this porous material.

b. Service condenser coil and evaporator coil weekly or more often if necessary (para 3-7).

c. Remove and clean air filters daily.

d. Service condensate pan as instructed in daily preventive maintenance services (para 3-6).

e. Operate as outlined in paragraph 2-13.

### 2-16. Operation Under Rainy or Humid Conditions

a. Keep condenser screen assembly and condenser grille assembly shielded from rain.

b. Keep all electrical components of unit clean and dry.

c. Service condenser and evaporator coils weekly, or more often if necessary.

d. Service condensate pan more often than instructed in the daily preventive maintenance services (para 3-6).

e. Operate as outlined in paragraph 2-13.

### 2-17. Operation in Salt-Water Areas

a. Keep all electrical components clean and dry.

b. Inspect condenser and evaporator coils for corrosion.

*Note.* Inspect condenser and evaporator coils very closely for corrosive deterioration of the metal exposed to air.

c. Paint all metal surfaces where paint is chipped, worn, cracked, or peeled. Refer to TM 9-213.

## CHAPTER 3

### OPERATOR AND ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

#### Section I. OPERATOR AND ORGANIZATIONAL MAINTENANCE REPAIR PARTS, TOOLS, AND EQUIPMENT

##### 3-1. Tools and Equipment

a. Basic issue tools and repair parts issued with or authorized for the air conditioner are listed in the Basic Issue Items List, Appendix C.

b. No special tools or equipment are required by the operator or organizational main-

tenance personnel for maintenance of the air conditioner.

##### 3-2. Organizational Maintenance Repair Parts

Organizational maintenance repair parts are listed and illustrated in TM 5-4120-288-25P.

#### Section II. LUBRICATION

##### 3-3. General Lubrication Information

a. This section contains lubrication instructions for the air conditioner.

##### 3-4. Detailed Lubrication Information

a. *General.* Keep all lubricants in closed containers and store in a clean dry place away from external heat. Allow no dust, dirt or other foreign material to mix with the lubricants. Keep all lubrication equipment clean and ready for use.

b. *Cleaning.* Keep all external parts not requiring lubrication clean of lubricants. Before lubricating the equipment, wipe all lubrication points free of dirt and grease. Clean all lubrication points after lubricating to prevent accumulation of foreign matter.

##### c. Points of Lubrication.

(1) *Shafts and Motors.* All shafts and motors have permanently lubricated bearings.

(2) *Refrigerant Compressor.* The compressor oil is enclosed in the refrigeration system and does not require periodic changing. The compressor oil should be changed only when contaminated by air, moisture or other system failures. The oil level should be within the compressor sight glass when the system is operating. When it is necessary to change the compressor oil, use only new sealed cans. See paragraph 1-4b (7) and 1-4b (8) for quantity and type of oil.

#### Section III. PREVENTIVE MAINTENANCE CHECKS AND SERVICES

##### 3-5. General

To insure that the air conditioner is ready for operation at all times, it must be inspected systematically, so that defects may be discovered and corrected before they result in serious

damage or failure. The necessary preventive maintenance services to be performed are listed and described in paragraphs 3-6 and 3-7. The item numbers indicate the sequence of minimum inspection requirements. Defects

discovered during operation of unit shall be noted for future correction, to be made as soon as operation has ceased. Stop operation immediately if a deficiency is noted during operation which would damage the equipment if operation were continued. All deficiencies and shortcomings will be recorded together with the corrective action taken, on DA Form 2404 (Equipment Inspection and Maintenance Worksheet) at the earliest possible opportunity.

### **3-6. Daily Preventive Maintenance Checks and Services**

This paragraph contains an illustrated tabulated listing of preventive maintenance services which must be performed by the operator. The item numbers are listed consecutively and

indicate the sequence of minimum requirements. Refer to table 3-1 for the daily preventive maintenance services.

### **3-7. Quarterly Preventive Maintenance Checks and Services**

*a.* This paragraph contains an illustrated tabulated listing of preventive maintenance services which must be performed by organizational maintenance personnel at quarterly intervals. A quarterly interval is equal to 3 calendar months or 250 hours of operation, whichever occurs first.

*b.* The item numbers are listed consecutively and indicate the sequence of minimum requirements. Refer to table 3-1 for the quarterly preventive maintenance services.

## **Section IV. OPERATOR'S MAINTENANCE**

### **3-8. General**

Instructions in this section are published for the information and guidance of the operator/crew to maintain the air conditioner.

### **3-9. Air Filter Replacement**

#### *a. Removal.*

- (1) Open air filter panel (fig. 2-5).
- (2) Remove air filter as instructed on figure 3-1.

#### *b. Cleaning and Inspection.*

- (1) Clean air filter with an approved solvent and dry thoroughly.

*Note.* Clean air filter periodically with hot water or steam. A nozzle pressure of 30-40 pounds is permissible. In heavy dusty areas presoak the filter in an approved solvent to clean thoroughly. Rinse with clean fresh water. Dry thoroughly.

#### *(2) Replace an unserviceable filter.*

*Note.* For new or a clean filter, spray air filter lightly with oil. Use oil with the following viscosity for given temperature:

| <i>SAE Viscosity</i> | <i>Operating Range F.</i> |
|----------------------|---------------------------|
| 60                   | 75°—130° F.               |
| 30                   | 40°— 75° F.               |
| 10 W                 | Below 40° F.              |

#### *c. Installation.*

- (1) Install air filter in reverse of the instructions on figure 3-1.
- (2) Close air filter panel (fig. 2-5).

### **3-10. Fan Belts Adjustment**

*a.* Remove left side upper and rear upper panels (para 3-29).

*b.* Adjust the fan belts as instructed on figure 3-2.

*c.* Replace left side upper and rear upper panels (para 3-29).

Table 3-1. Preventive Maintenance Checks and Services

| Item number | Interval |   |   |      | B—Before operation<br>D—During operation |   | A—After operation<br>W—Weekly                   |   | M—Monthly<br>Q—Quarterly |       |
|-------------|----------|---|---|------|--|---|---|---|--------------------------|-------|
|             | Operator |   |   | Org. | M  | Q | Item to be inspected                            | Procedure   | Reference                |       |
|             | Daily    |   |   |      |  |   |   |   |                          |       |
|             | B        | D | A | W    |  |   |   |   |                          |       |
| 1           |          |   |   | X    | X  |   | Air Filter                                      | Clean and service filter.   |                          | 3-9   |
| 2           | X        |   |   |      | X  |   | Condensate Pan                                  | Inspect for accumulation of water.<br>Empty and clean pan.  |                          |       |
| 3           | X        | X |   |      | X  |   | Gages   | Inspect the liquid and moisture indicator. Indicator turns yellow if moisture is in refrigerant. Inspect compressor oil level. Correct level is marked on center of sight level gauge. Check refrigerant after continuous operation of unit from $\frac{1}{2}$ to $1\frac{1}{2}$ hours. If refrigerant passing through liquid and moisture indicator is clear and cooling is produced, the system is properly charged. If cloudiness or bubbles appear, additional refrigerant is needed. |                          |       |
| 4           | X        |   |   |      | X  |   | Control Boxes, Remote Control Panel and Wiring. | Inspect selector switch, circuit breaker, and temperature control for proper operation and mounting. Inspect all wiring for cracks, frayed conditions and corroded connections.   |                          |       |
| 5           |          | X |   |      | X  |   | Motors, Fans and Housing.                       | Check for unusual noise in evaporator and condenser assemblies. Inspect for proper operation, mounting, alignment and condition of wiring.  |                          |       |
| 6           | X        |   |   |      | X  |   | Belts and Sheaves.                              | Inspect belts for frayed, cracked, or worn condition, and proper adjustment. Correct belt deflection is $\frac{1}{2}$ inch midway between sheaves. Inspect sheaves for cracks, breaks, and alignment.   |                          |       |
| 7           |          |   |   |      | X  |   | Switches and Wiring Harness.                    | Inspect all switches for breakage, burns, and improper operation. Inspect wiring for breakage, worn or frayed insulation and secure mounting.   | 6-28                     |       |
| 8           |          |   |   |      | X  |   | Refrigerant Receiver.                           | Inspect for loose or missing mounting hardware, leak or other damage.   |                          | 6-101 |
| 9           | X        |   |   |      | X  |   | Condenser and Evaporator.                       | See if coil fins are clean. Clean with a soft brush. Check tubing connections for leaks and damage.   |                          |       |
| 10          |          |   |   |      | X  |   | Refrigerant Desiccant Dehydrator.               | Inspect for leaks and secure mounting. Check for clogging by feeling liquid leaving and entering lines. Should leaving line be cooler than entering line, dehydrator is clogged. Condensation or frost appearing at dehydrator outlet may also indicate clogging.   | 6-50                     |       |
| 11          |          |   |   |      | X  |   | Motor Starting and Protective Devices.          | Inspect starter assembly, relay and thermostat switch for loose mounting and connections.   |                          |       |

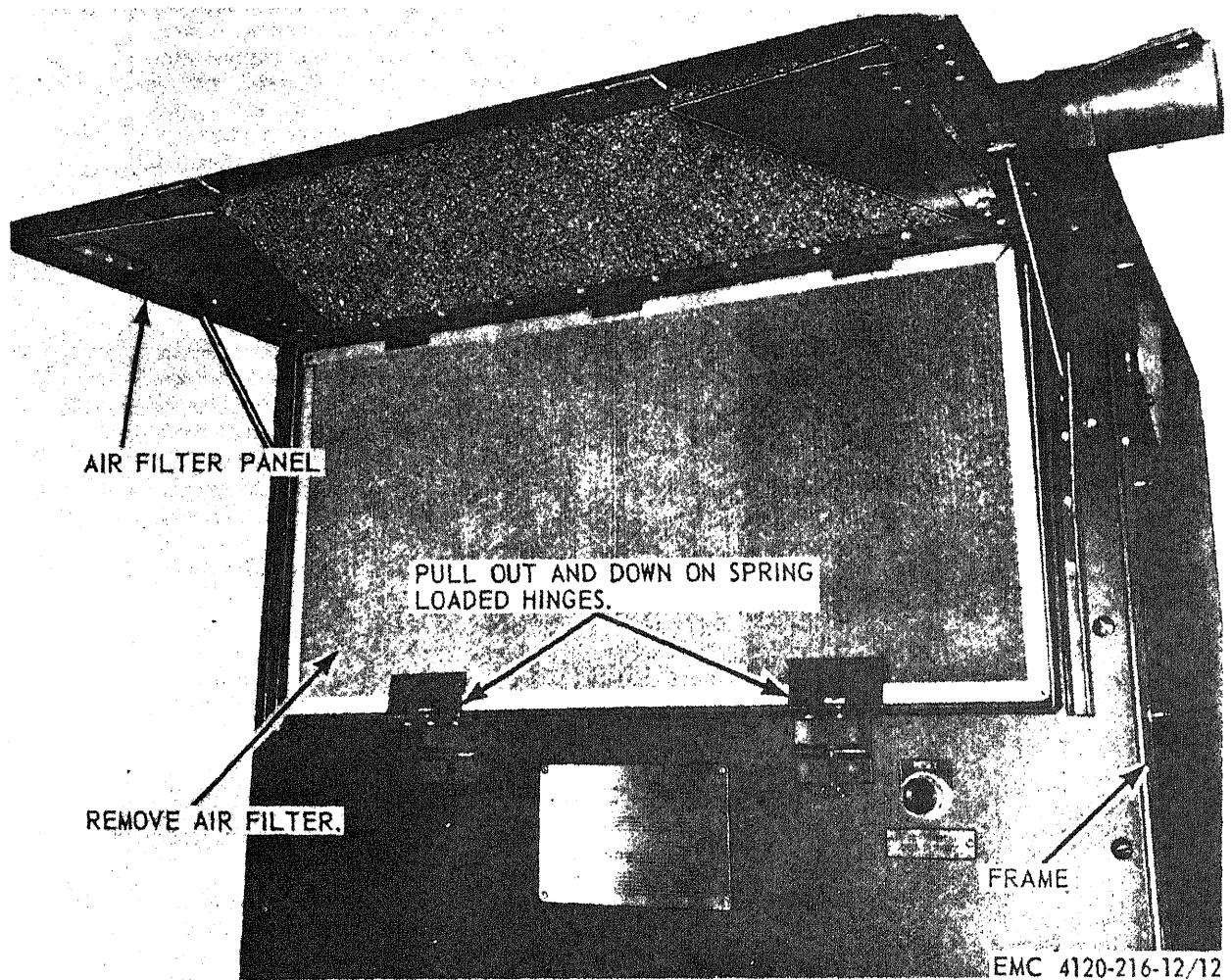


Figure 3-1. Air filter, removal and installation.

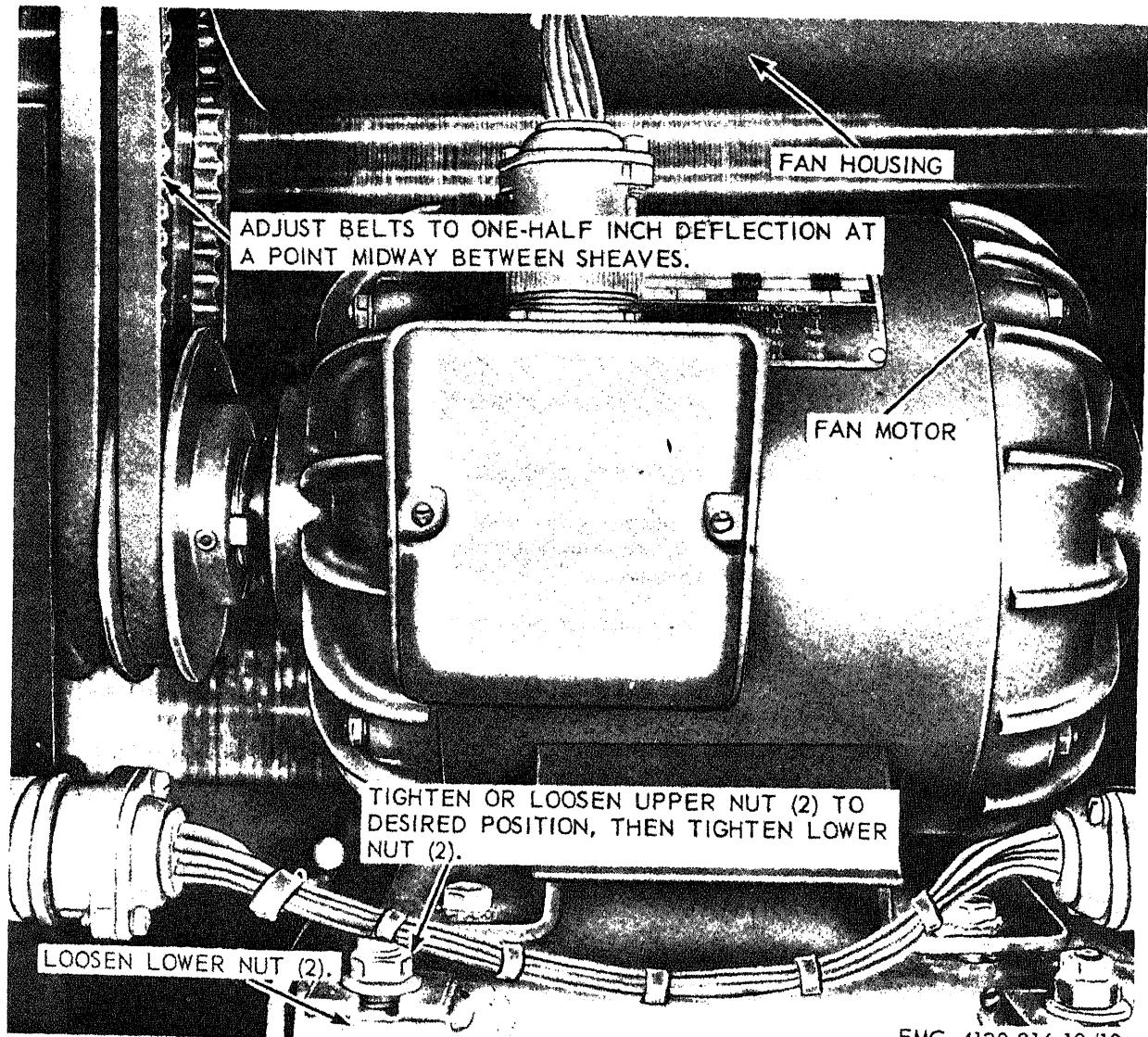


Figure 3-2. Fan belt adjustment.

## Section V. TROUBLESHOOTING

### 3-11. General

This section provides information useful in diagnosing and correcting unsatisfactory operation or failure of the air conditioner and its components. Any trouble beyond the scope of organizational maintenance shall be reported to direct support maintenance.

### 3-12. Troubleshooting Table

Malfunctions which may occur are listed in Table 3-2. Each malfunction stated is followed by a list of probable causes of the trouble. The corrective action recommended is described opposite the probable cause.

Table 3-2. Troubleshooting.

| Malfunction                               | Probable cause  | Corrective action  |
|---|---|--|
| 1. COOLING INSUFFICIENT                   | <ul style="list-style-type: none"> <li>a. Dirty evaporator or condenser coils.</li> <li>b. Dirty or defective air filters</li> <li>c. Improper refrigerant level</li> <li>d. Thermostatic bulb defective</li> <li>e. Expansion valve defective</li> <li>f. Setpoint adjuster set too high</li> <li>g. Wire lead harness defective</li> </ul>  | <ul style="list-style-type: none"> <li>a. Service the coils (table 3-1).</li> <li>b. Service a dirty air filter (para 3-9). Replace a defective air filter (para 3-9).</li> <li>c. Inspect refrigerant sight glass (table 3-1). Report condition to direct support maintenance.</li> <li>d. Report defective thermostatic bulb to direct support maintenance.</li> <li>e. Report condition to direct support maintenance.</li> <li>f. Report to direct support maintenance to have the setpoint adjuster properly set, or replaced.</li> <li>g. Report condition to direct support maintenance.</li> </ul> |
| 2. AIR CONDITIONER NOISY DURING OPERATION | <ul style="list-style-type: none"> <li>a. Condenser fan damaged</li> <li>b. Condenser grille assembly or condenser screen assembly obstructed or damaged.</li> <li>c. Compressor oil level low</li> <li>d. Evaporator fan motor, sheaves, housing, or fan belts defective.</li> </ul>   | <ul style="list-style-type: none"> <li>a. Replace condenser fan (para 3-34).</li> <li>b. Remove the obstruction or replace the condenser screen assembly or the condenser grille assembly (para 3-40).</li> <li>c. Inspect for leaks and check oil level sight glass (table 3-1). Report condition to direct support maintenance.</li> <li>d. Adjust or replace fan belts (para 3-10). Replace defective sheaves (para 3-36). Replace damaged evaporator fan housing (para 3-38).</li> </ul>   |
| 3. AIR CONDITIONER FAILS TO START         | <ul style="list-style-type: none"> <li>a. Power failure, control cable or power cable damaged, defective fuses, overload relay burned out, defective contacts or defective wiring harness, damaged or defective control boxes.</li> <li>b. Remote control panel defective.</li> <li>c. Thermostatic bulb defective</li> <li>d. Setpoint adjuster needs adjusting or is defective.</li> <li>e. Compressor defective</li> </ul> | <ul style="list-style-type: none"> <li>a. Check power supply. Inspect the control cable and power cable. Report burned out overload relay, contacts, and damaged control boxes to direct support maintenance. Replace defective fuses (para 3-42).</li> <li>b. Report defective remote control panel to direct support maintenance.</li> <li>c. Report defective thermostatic bulb to direct support maintenance.</li> <li>d. Report need of adjustment or defective setpoint adjuster to direct support maintenance.</li> <li>e. Report condition to direct support maintenance.</li> </ul>               |
| 4. AIR CONDITIONER COOLING EXCESSIVE      | <ul style="list-style-type: none"> <li>a. Setpoint adjuster set too low or defective.</li> <li>b. Defective electrical controls</li> </ul>  | <ul style="list-style-type: none"> <li>a. Report setpoint adjuster set too low or is defective to direct support maintenance.</li> <li>b. Report electrical deficiency to direct support maintenance.</li> </ul>   |
| 5. AIR CONDITIONER STOPS                  | <ul style="list-style-type: none"> <li>a. Main power supply off</li> </ul>  | <ul style="list-style-type: none"> <li>a. Report condition to direct support maintenance, to provide power from an auxiliary source.</li> </ul>  |

| Malfunction   | Probable cause   | Corrective action  |
|---|--|--|
| 6. COMPRESSOR AUTOMATICALLY TRIPS AT DUAL PRESSURE SWITCH | <p>b. Remote control panel has defective controls.</p> <p>c. Compressor fails to start ____</p> <p>d. Relays in control boxes defective.</p> <p>a. Condenser fan damaged ____</p> <p>b. Condenser grille assembly or condenser screen assembly obstructed.</p> <p>c. Dual pressure switch defective.</p> | <p>b. Report defective circuit breaker, selector switch, setpoint adjuster, or wiring harness to direct support maintenance.</p> <p>c. Report condition to direct support maintenance.</p> <p>d. Report condition to direct support maintenance.</p> |

## Section VI. FIELD EXPEDIENT REPAIRS

### 3-13. General

Operator and organizational maintenance troubles may occur while the air conditioner is operating in the field where supplies and repair parts are not available and normal corrective maintenance cannot be performed. When this condition exists, the following expedient repairs may be used in emergencies, upon the decision of the unit commander. Equipment so repaired must be removed from operation as soon as possible and properly repaired before being placed into normal operation again.

### 3-14. Air Flow Restricted

| Trouble                   | Expedient Remedy   |
|---------------------------|--|
| Air filter defective ____ | Remove the air filter from the unit (para 3-9) and operate without it. |

### 3-15. Selector Switch Defective

| Trouble                    | Expedient Remedy  |
|----------------------------|---|
| Selector switch stuck ____ | Stop air conditioner by moving the circuit breaker (A, fig. 2-4) to OFF position. |

### 3-16. Evaporator Fan Belts Slipping

| Trouble                            | Expedient Remedy   |
|------------------------------------|--|
| Damaged, worn, or broken fan belt. | Remove the defective fan belt (para 3-36). Adjust for operation with remaining fan belt (para 3-10). |

### 3-17. Filter Panel Cover Damaged

| Trouble                              | Expedient Remedy   |
|--------------------------------------|--|
| Defective filter panel canvas cover. | Fabricate an adjustable cover to fit over the air filter in the filter panel assembly. |

### 3-18. Outside Air Damper Damaged

| Trouble   | Expedient Remedy   |
|---|--|
| Damaged handle, bracket, or outside air damper. | Remove the damaged parts from the unit. Fabricate a substitute damper to close the opening and obtain fresh air through the filter panel cover and air filter. |

## Section VII. RADIO INTERFERENCE SUPPRESSION

### 3-19. Definitions

a. *Interference*. The term "interference" as used herein, applies to electrical disturbances in the radio frequency range which are generated by the air conditioner and which may

interfere with the proper operation of radio receivers or other electronic equipment.

b. *Interference Suppression*. The term "interference suppression" as used herein, applies to the methods used to eliminate or effectively

reduce radio interference generated by the air conditioner.

### **3-20. General Methods used to Obtain Proper Suppression**

*a.* Essentially, suppression is attained by providing a low resistance path to ground for the stray current. The methods used include shielding the ignition and high-frequency wires, grounding the frame with bonding straps and using capacitor and resistors.

### **3-21. Interference Suppression Components**

*a. Primary suppression component, capacitors.* The capacitors are illustrated in figure 3-3.

*b. Secondary suppression components, tooth-type lockwashers.* The capacitors are secured to the control box assembly with two screws and tooth-type lockwashers.

### **3-22. Replacement of Suppression Components**

*a. General.* Replacement suppression compo-

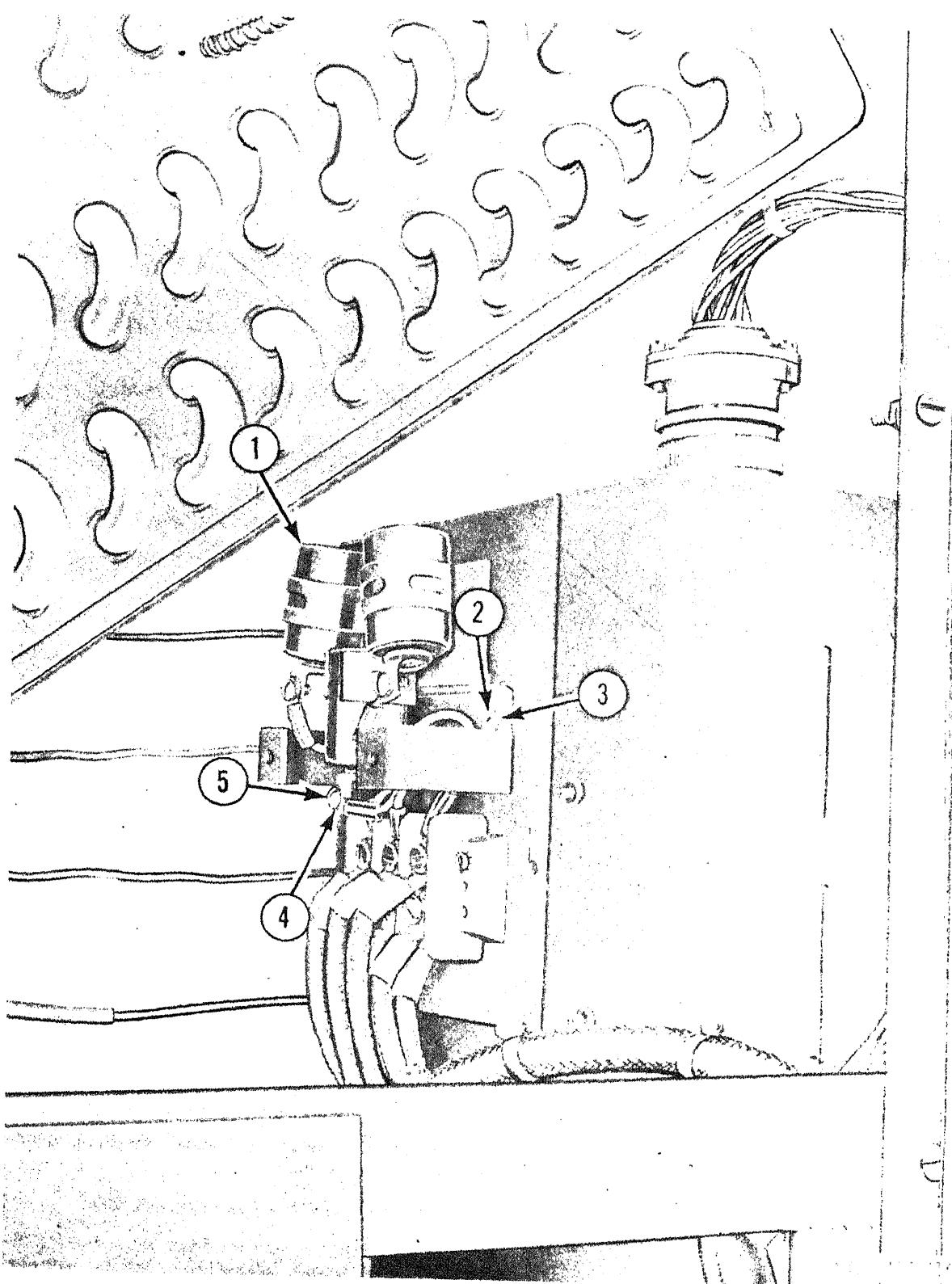
nents must be identical to the original part, with the same microfarad and voltage rating as the parts being replaced. Special care must be taken to be certain there is a good metal-to-metal contact with the washers.

*b. Primary suppression component (capacitors).* Replace the capacitors as instructed in paragraph 3-43.

*c. Secondary suppression components (tooth-type lockwashers).* Replace lockwashers as instructed in paragraph 3-43.

### **3-23. Testing of Radio Suppression Component**

Test the capacitors for leaks and shorts on a capacitor tester; replace defective capacitors. If test equipment is not available and interference is indicated, isolate the cause of interference by the trial-and-error method of replacing each capacitor in turn until the cause of interference is located and eliminated.



1 Capacitor, .1 microfarad, 500 volt  
(3).

2 Screw, No. 6-32 x  $\frac{3}{8}$  in.  
3 Washer, lock, ET, No. 6.

4 Washer, lock, ET, No. 10.  
5 Screw, No. 10-32 x  $\frac{1}{2}$  in. lg.

Figure 3-3. Radio suppression components.

## Section VIII. PANELS AND HOUSING

### 3-24. General

The air conditioner frame assembly is constructed of welded formed aluminum sections. Aluminum panels are secured on the frame assembly and designed with oval-head studs for ease of removal and access to the interior where components of the unit are mounted. All panels are sealed with gaskets that mount on the frame assembly, and the interior of the panel is covered with fabricated insulation to reduce moisture, condensation, and noise. The rear panel assembly is designed with an adjustable filter panel cover over where the air filter is installed. The filter panel cover opens easily for servicing the air filter. A small air damper cover is secured on the lower front panel, to provide access to the damper door handle. Fresh air is also admitted through the open filter panel cover and air filter. Condenser fans pull fresh outside air through the condenser screen assembly, over the condenser tubing, valves, and condenser coil. The air is then exhausted through the fan and condenser grille assembly.

### 3-25. Canvas Cover and Holdown Bar

a. *Removal.* Remove canvas cover and holdown bar as instructed on figure 3-4.

b. *Cleaning, Inspection, and Repair.*

- (1) Clean all parts with an approved solvent and dry thoroughly.
- (2) Inspect all parts for wear, deterioration, and other damage.
- (3) Replace unserviceable parts.

c. *Installation.* Install canvas cover and holdown bar in the reverse of instructions on figure 3-4.

### 3-26. Cover and Lifting Eye

a. *Removal.* Remove cover and lifting eye as instructed on figure 3-5.

b. *Cleaning, Inspection, and Repair.*

- (1) Clean all parts with an approved solvent and dry thoroughly.
- (2) Inspect all parts for cracks, wear, nicks, and other damage.

(3) Replace unserviceable parts.

c. *Installation.* Install lifting eye and cover in reverse of instructions on figure 3-5.

### 3-27. Air Filter Panel

a. *Removal.*

- (1) Open air filter panel (fig. 2-5).
- (2) Remove air filter panel from filter panel assembly as instructed on figure 3-6.

b. *Cleaning, Inspection, and Repair.*

- (1) Clean all parts in an approved cleaning solvent and dry thoroughly.
- (2) Inspect all parts for bends, cracks, breaks, or other damage.
- (3) Replace all damaged or defective parts.

c. *Installation.*

- (1) Install air filter panel on filter panel assembly in reverse of instructions on figure 3-6.

• (2) Close air filter panel.

### 3-28. Filter Panel Assembly

a. *Removal.*

- (1) Remove air filter from air filter panel assembly (para 3-9).
- (2) Remove filter panel assembly as instructed on figure 3-7.

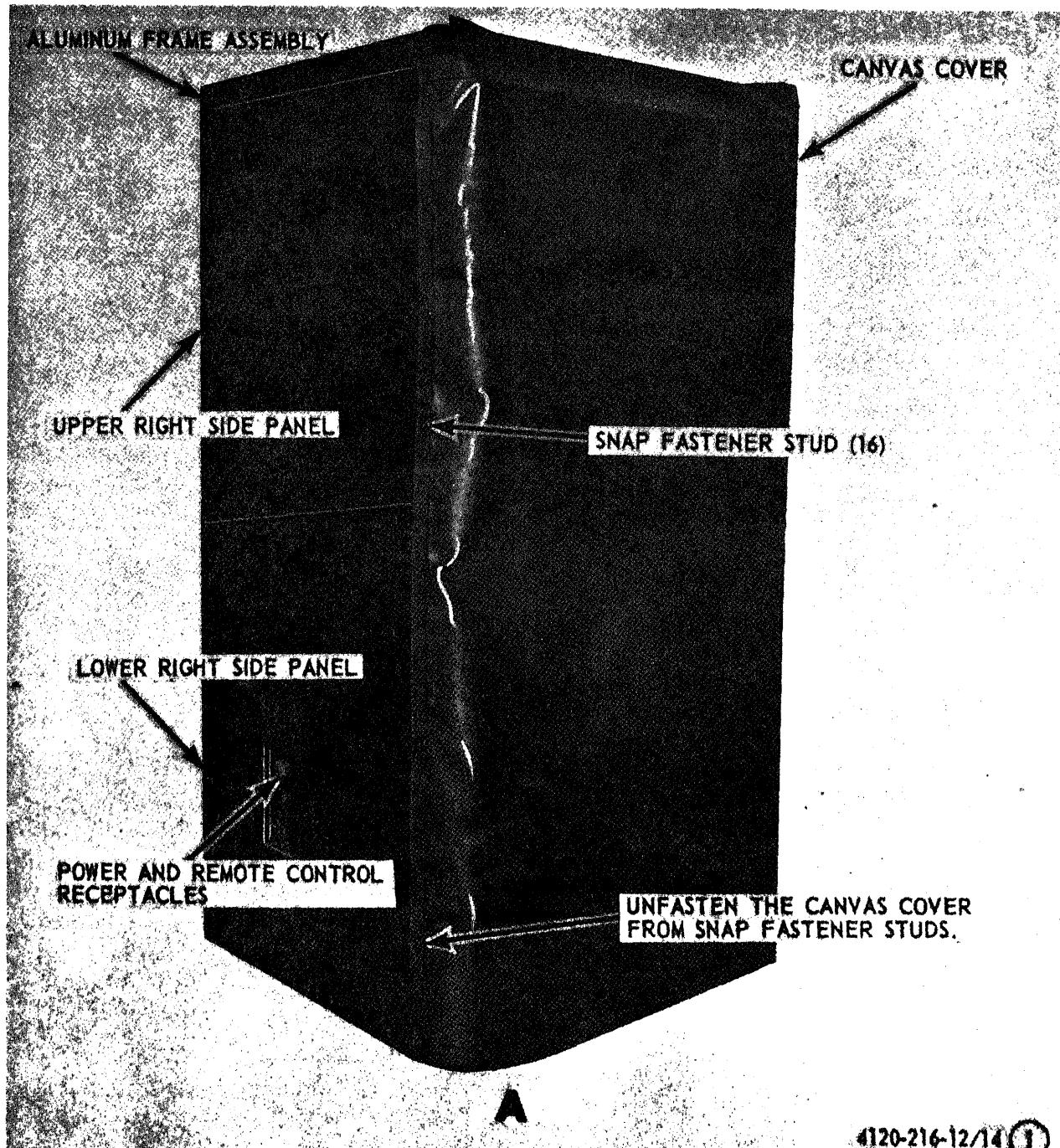
b. *Disassembly.* Disassemble filter panel assembly as illustrated on figure 3-8.

*Note.* Remove oval-head stud from filter panel assembly only when defective. Replace mating receptacle screw (para 3-31) in frame assembly.

*Note.* Do not remove fabricated insulation unless damaged or deteriorated.

c. *Cleaning, Inspection, and Repair.*

- (1) Clean fabricated insulation inside filter panel assembly with a suitable soft bristle brush.
- (2) Clean all parts with an approved cleaning solvent and dry thoroughly.

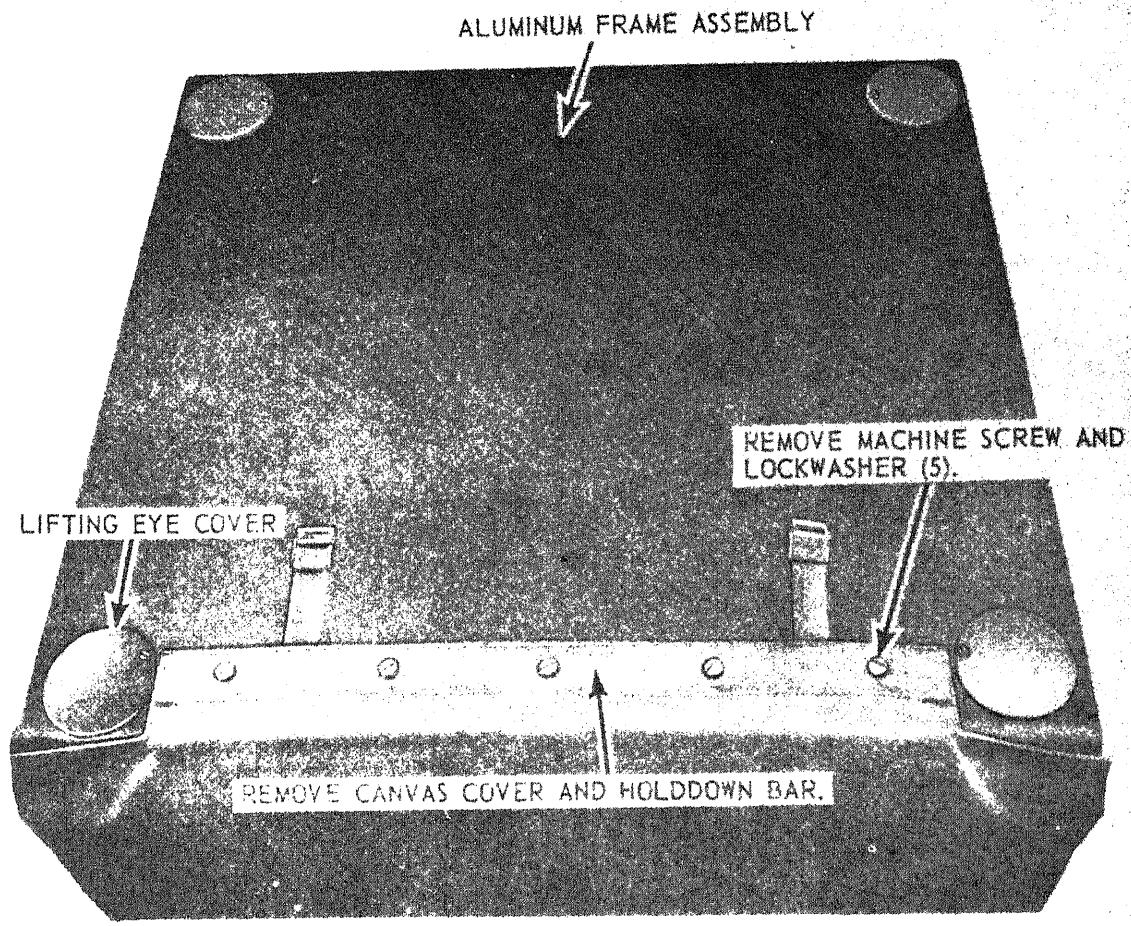


*A. Canvas cover removal.*  
*Figure 3-4 ①. Canvas cover and holdown bar, removal and installation.*

- (3) Inspect all parts for cracks, wear, dents, deterioration and other damage.
- (4) Repair or replace all unserviceable parts.

*d. Reassembly.* Reassemble filter panel assembly in reverse of the instructions on figure 3-8.

*Note.* Install the fabricated insulation with an approved adhesive.



B

4120-216-12/14 (2)

*B. Canvas cover and holddown bar.*  
Figure 3-4 ②.—Continued.

*e. Installation.*

- (1) Install filter panel assembly in reverse of instructions on figure 3-7.
- (2) Install air filter on filter panel assembly (para 3-9).

**3-29. Panels**

*a. Removal.* Remove panels from frame assembly as illustrated on figure 3-9A.

*b. Disassembly.* Disassemble panels as instructed on figure 3-10.

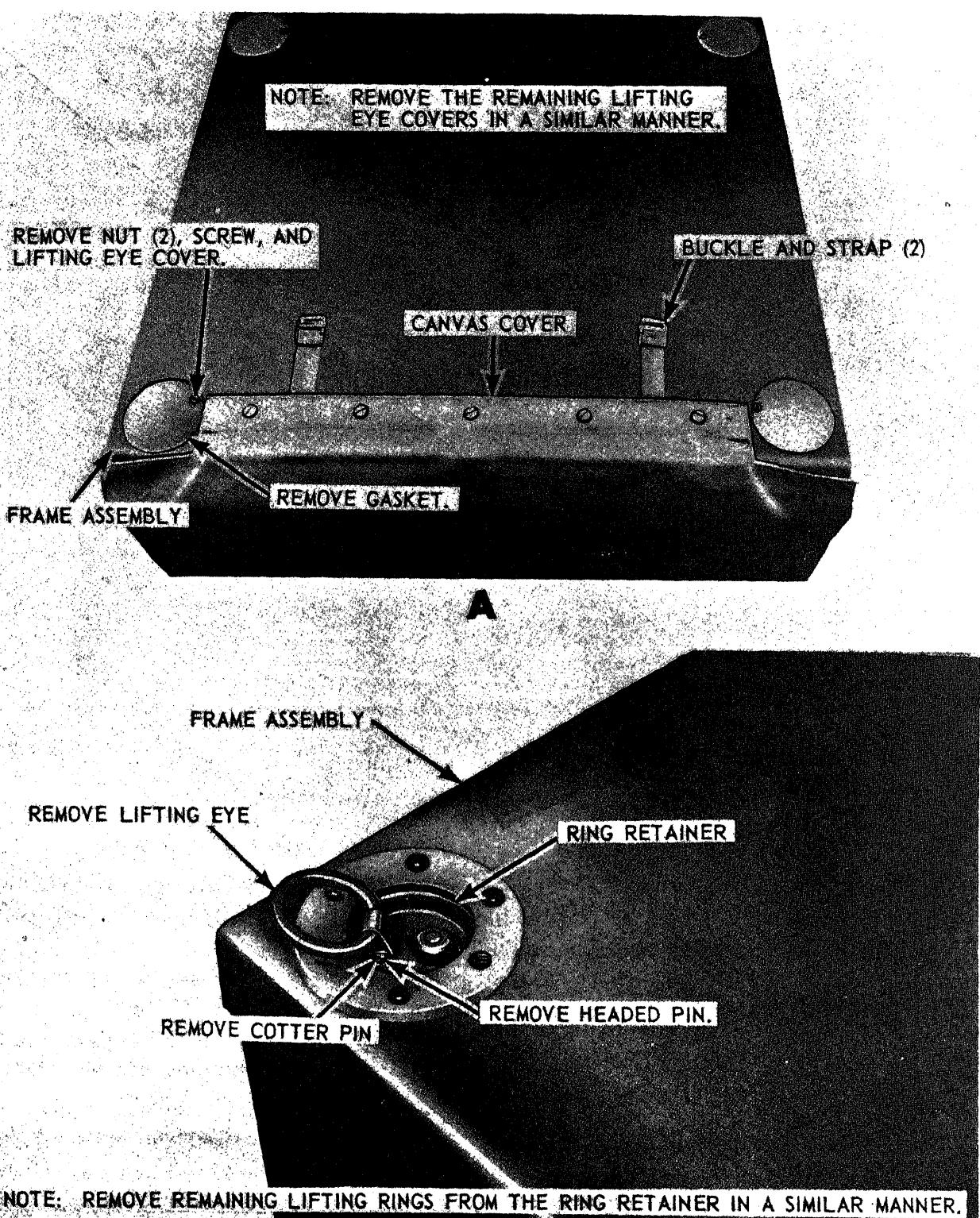
*Note.* Remove oval-head stud from side panel only

when defective. Replace mating receptacle screw (para 3-31) in frame assembly.

Note. Do not remove fabricated insulation unless damaged or deteriorated.

*c. Cleaning, Inspection, and Repair.*

- (1) Clean fabricated insulation inside the panels with a suitable soft bristle brush.
- (2) Clean all parts with an approved solvent and dry thoroughly.
- (3) Inspect all parts for cracks, wear, dents, deterioration, and other damage.



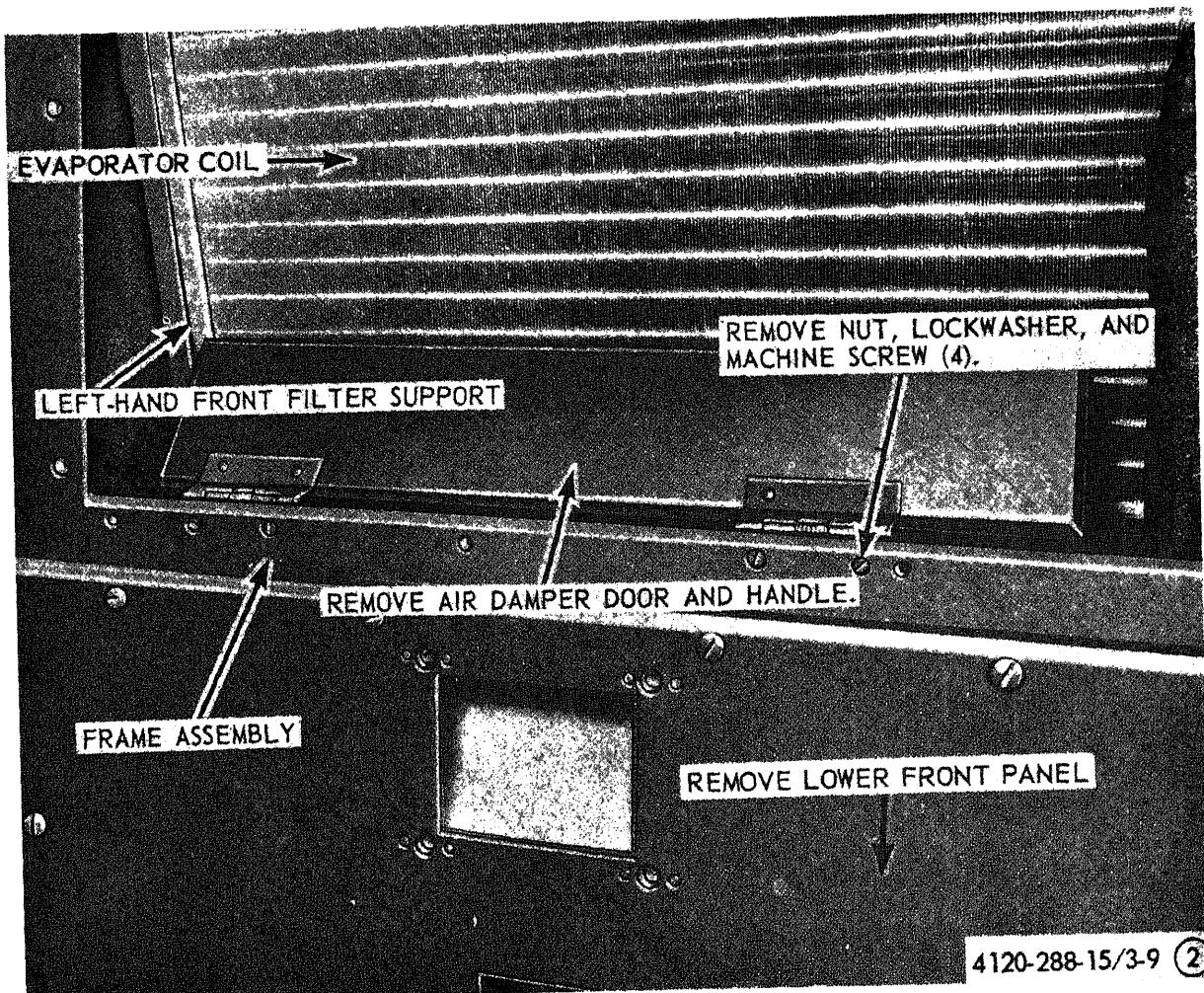
**B**

4120-216-12/15

A. Lifting eye cover.

B. Lifting eye.

Figure 3-5. Cover and lifting eye, removal and disassembly.

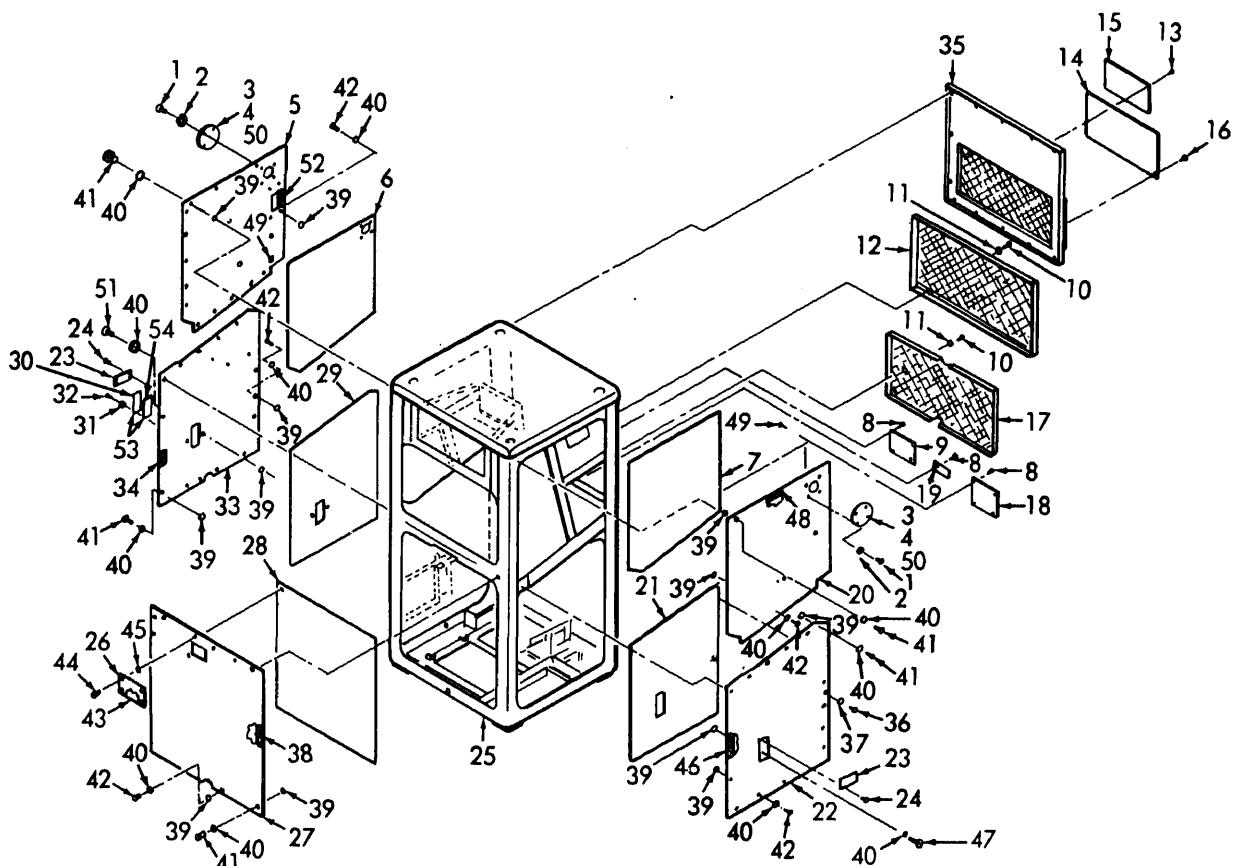


*B. Air damper removal.*  
*Figure 3-9 (2).—Continued.*

- (2) Clean snap fastener studs and receptacles with an approved solvent and dry thoroughly.
- (3) Inspect all parts for cracks, wear, nicks, deterioration, and other damage.  
*Note.* Inspect frame assembly for cracks, wear, broken weld, and other damage. Report unserviceable conditions to direct support maintenance.
- (4) Replace unserviceable parts.

*c. Installation.*

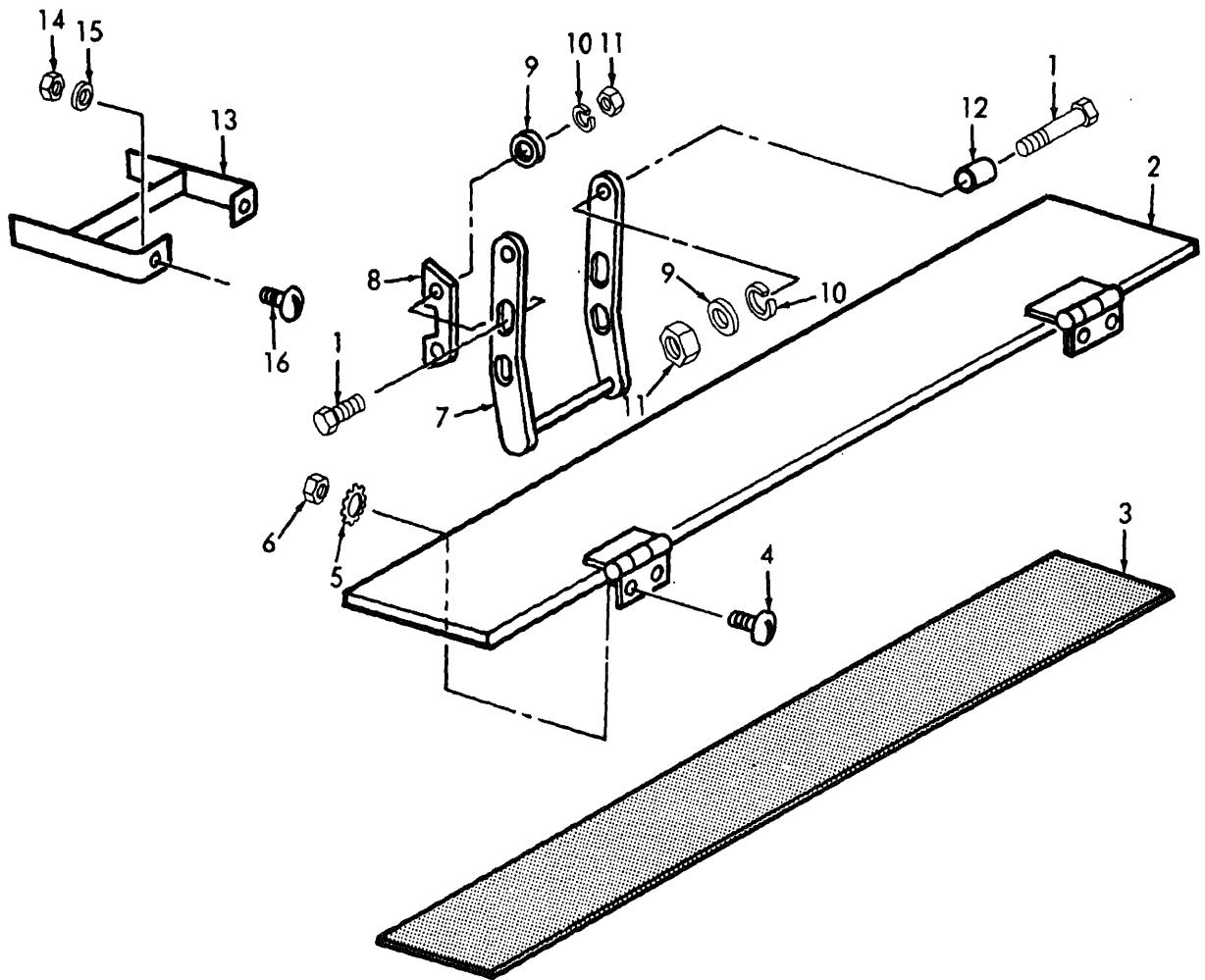
- (1) Install insulation, snap fastener studs, and receptacles on frame assembly in reverse of instructions on figure 3-12.
- (2) Install upper and lower left side panels, lower front panel, upper and lower right side panels (para 3-29), and filter panel assembly (para 3-28).



4120-288-15/3-10

|                                     |                                  |                         |
|-------------------------------------|----------------------------------|-------------------------|
| 1 Screw, machine (8)                | 19 Info. plate: Cond. serv. sw   | 39 Ring retaining (109) |
| 2 Washer, lock (22)                 | 20 Panel assembly                | 40 Eyelet (109)         |
| 3 Cover (2)                         | 21 Gasket                        | 41 Stud assembly (35)   |
| 4 Gasket                            | 22 Panel assembly                | 42 Stud assembly (62)   |
| 5 Panel assembly                    | 23 Info. plate, high voltage (2) | 43 Gasket               |
| 6 Insulation, rubber                | 24 Rivet (8)                     | 44 Stud assembly (4)    |
| 7 Gasket, rubber                    | 25 Frame assembly                | 45 Retainer (4)         |
| 8 Rivet (10)                        | 26 Cover assembly                | 46 Gasket               |
| 9 Plate, identification             | 27 Panel assembly                | 47 Stud assembly        |
| 10 Screw, cap (10)                  | 28 Gasket                        | 48 Gasket               |
| 11 Washer, lock (10)                | 29 Gasket                        | 49 Nut, clinch (8)      |
| 12 Grille                           | 30 Cover                         | 50 Insulation           |
| 13 Rivet (8)                        | 31 Washer, lock (22)             | 51 Stud assembly (2)    |
| 14 Info. plate, wiring diagram      | 32 Screw, machine (4)            | 52 Gasket               |
| 15 Info. plate, wiring diagram con- | 33 Panel assembly                | 53 Cover assembly       |
| trol panel                          | 34 Gasket                        | 54 Gasket               |
| 16 Rivet (6)                        | 35 Filter panel assembly         |                         |
| 17 Screen                           | 36 Fastener snap (22)            |                         |
| 18 Info. plate: Compressor Valves,  | 37 Washer lock (22)              |                         |
| Caution                             | 38 Gasket                        |                         |

Figure 8-10. Panels, exploded view.



4120-288-15/3-11

1 Capscrew (6)  
 2 Air damper door  
 3 Air damper door insulation  
 4 Screw, machine (4)  
 5 Washer, lock (4)  
 6 Nut (2)

7 Handle  
 8 Catch  
 9 Washer, flat (12)  
 10 Washer, lock (6)  
 11 Nut (6)  
 12 Sleeve (2)

13 Bracket  
 14 Nut, selflocking (2)  
 15 Washer, flat (2)  
 16 Screw, machine (2)

Figure 3-11. Air damper door, exploded view.

NOTES REMOVE RECEPTACLES FROM REAR SIDE

INSTALL RECEPTACLES ON FRONT FRAME ASSEMBLY  
WITH REAR FRAME ASSEMBLY

REMOVE NUT AND  
RECEPTACLES BY

INSULATION

REMOVE NUT, LOCKWASHER AND  
SNAP FASTENER STUDS (3)

INSULATION

FRAME ASSEMBLY

RECEPTACLES

REMOVE RECEPTACLES

4120-288-15/3-12

Figure 3-12. Insulation, snap fastener studs, and receptacles on the rear and right side of the frame assembly, removal and installation.

## Section IX. CIRCULATING AIR SYSTEM

### 3-32. General

The air conditioner's circulating air system consists of an evaporator fan and two condenser fans which operate independently in the circulating system. A screen assembly, located at the bottom rear of the frame assembly, protects tubing in the condenser section and admits fresh air which is circulated by the two condenser fans. Fresh air passes through the condenser coil and exhausts through the condenser grille. The service switch must be positioned "ON" for condenser fans to operate. A thermostatic bulb is interlocked electrically with the service switch and will stop condenser fans when the fresh air drawn into condenser section is too cool. A condenser grille assembly is mounted on rear of the frame assembly to protect personnel when unit is operating. Each of the condenser fans are secured on a motor shaft. Each fan motor has a separate housing, and can be removed from unit by disconnecting electrical harness and removing the housing and motor as an assembly. The evaporator air system circulates air through the air outlet into ducts that receive the conditioned air. A temperature transmitter located in the air outlet automatically stops unit when conditioned air becomes too cool. The return air duct is secured to the front of air conditioner. When fresh air is desired the filter panel cover is opened as required. The evaporator fan is driven by V-type drive belts from a dual groove-type adjustable sheave secured on the drive motor shaft. The drive motor is secured on an adjustable base for adjustment of the drive belts.

### 3-33. Condenser Grille Assembly and Condenser Screen Assembly

*a. Removal.* Remove condenser grille assembly and condenser screen assembly as instructed on figure 3-13.

*b. Cleaning, Inspection, and Repair.*

- (1) Clean all parts with an approved cleaning solvent and dry thoroughly.
- (2) Inspect all parts for cracks, breaks, dents, and other damage.

(3) Replace all unserviceable parts.

*c. Installation.* Install condenser screen assembly and condenser grille assembly in reverse of instructions on figure 3-13.

### 3-34. Condenser Fan Assembly

*a. Removal.*

*Caution:* Be sure that the power cable and the control cable are disconnected from air conditioner to avoid injury to personnel.

- (1) Remove condenser grille assembly (para 3-33).
- (2) Remove fan blade from condenser fan motor shaft and condenser fan housing as instructed on figure 3-14.

*b. Cleaning, Inspection, and Repair.*

- (1) Clean all parts with an approved solvent and dry thoroughly.
- (2) Inspect all parts for nicks, cracks, wear, and other damage.
- (3) Repair or replace all unserviceable parts.

*c. Installation.*

(1) Install fan blade on condenser fan motor as instructed on figure 3-14.  
*Note.* Be sure that fan blade will not contact condenser fan housing when operating.

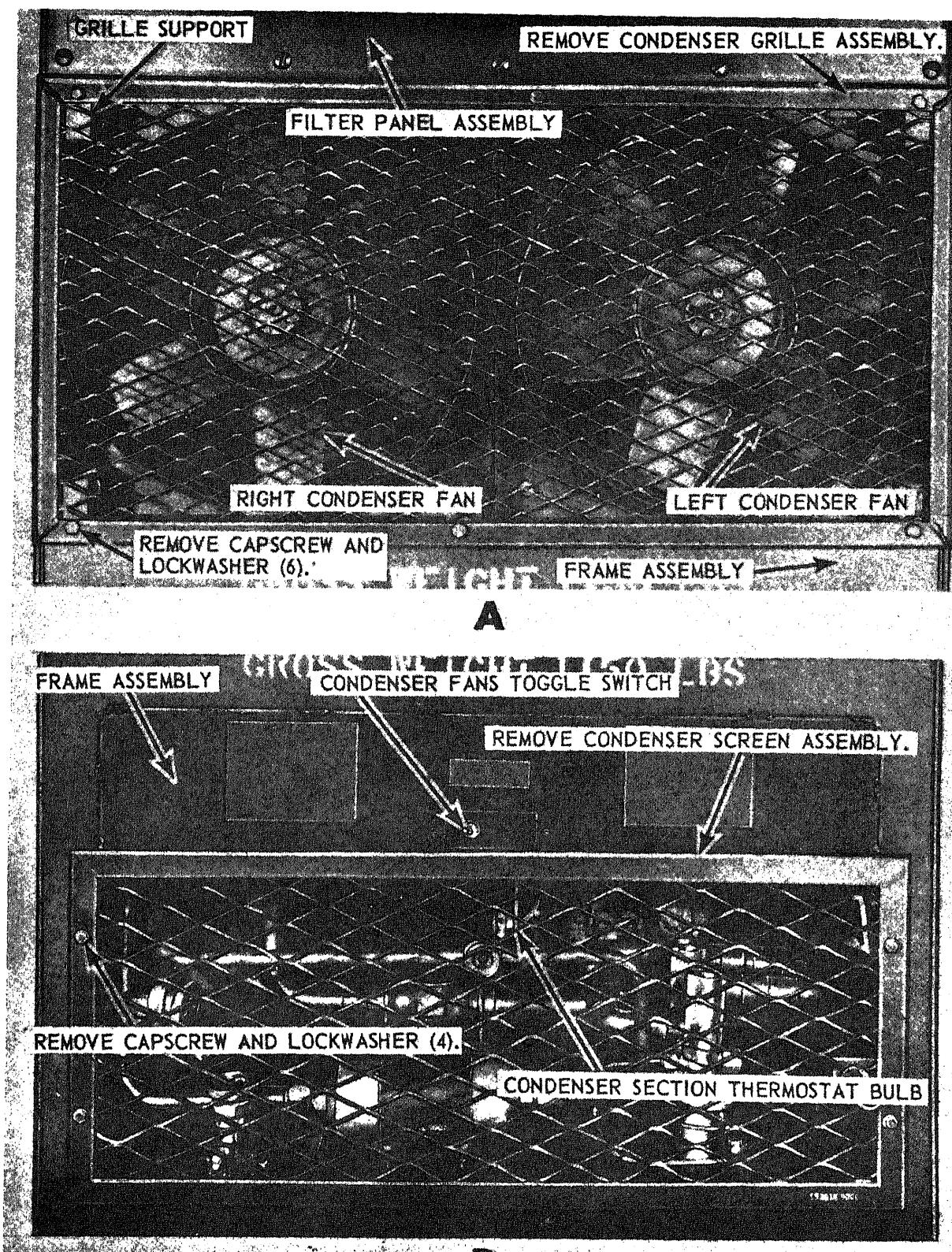
- (2) Install the condenser grille assembly (para 3-33).

### 3-35. Condenser Fan Housing and Motor Assembly

*a. Removal.*

*Caution:* Be sure that power cable and the control cable are disconnected from air conditioner to avoid injury to personnel.

- (1) Remove condenser grille assembly (para 3-33).
- (2) Remove lower right side panels and lower left side panels (para 3-29).
- (3) Remove condenser fan housing, with motor and fan blade installed, as instructed on figure 3-15.



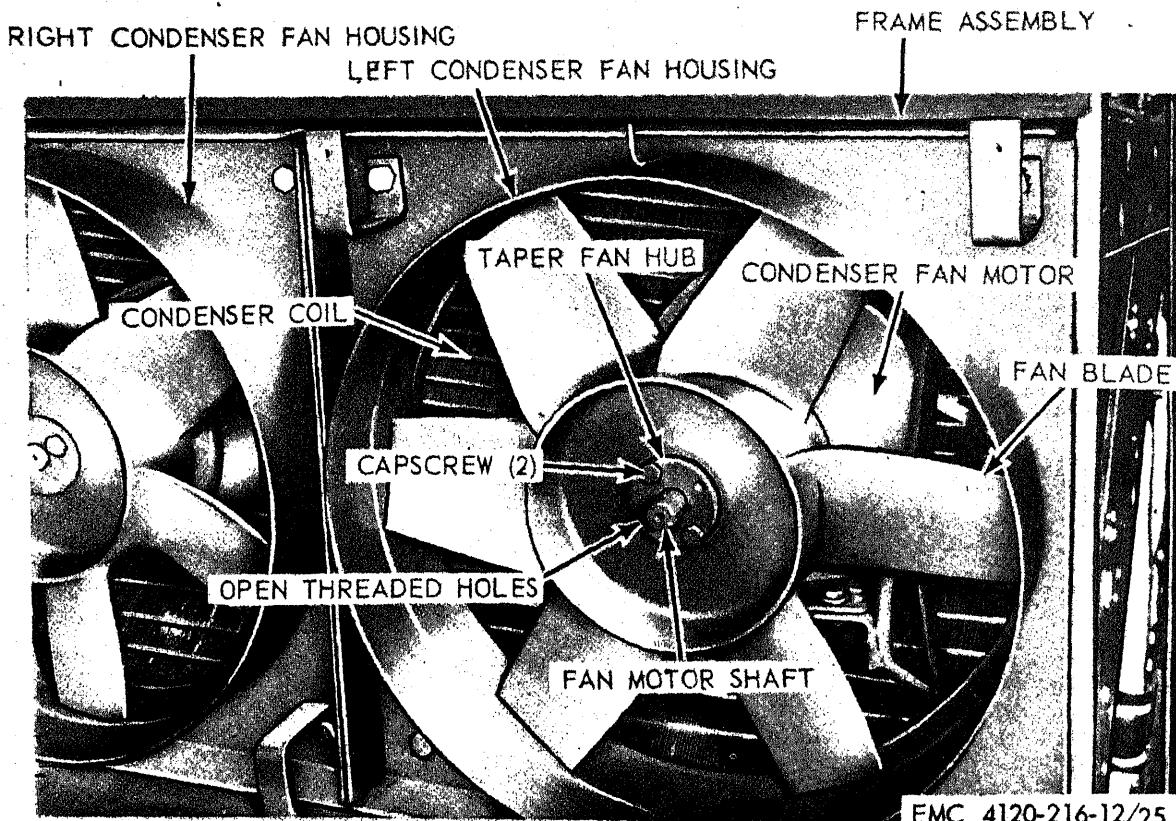
A. Condenser grille assembly.

B. Condenser screen assembly.

Figure 3-19. Condenser grille and condenser screen assemblies, removal and installation.

4120-216-12/24

1. REMOVE CAPSCREW (2).
2. INSTALL CAPSCREW (2) IN OPEN THREADED HOLES.
3. TURN CAPSCREW (2) IN EVENLY AND REMOVE TAPER FAN HUB, MACHINE KEY, AND FAN BLADE FROM THE CONDENSER FAN MOTOR SHAFT.
4. REMOVE THE RIGHT CONDENSER FAN BLADE IN A SIMILAR MANNER.
5. POSITION FAN BLADE, MACHINE KEY, AND TAPER HUB ON FAN MOTOR SHAFT AND INSTALL CAPSCREW (2) IN MOUNTING POSITION. PULL CAPSCREWS DOWN EVENLY TO SECURE ASSEMBLY.



EMC 4120-216-12/25

Figure 3-14. Condenser fan blades, removal and installation.

*b. Disassembly.* Disassemble fan blade, condenser fan motor, and condenser fan housing as instructed on figure 3-16.

*c. Cleaning, Inspection, and Repair.*

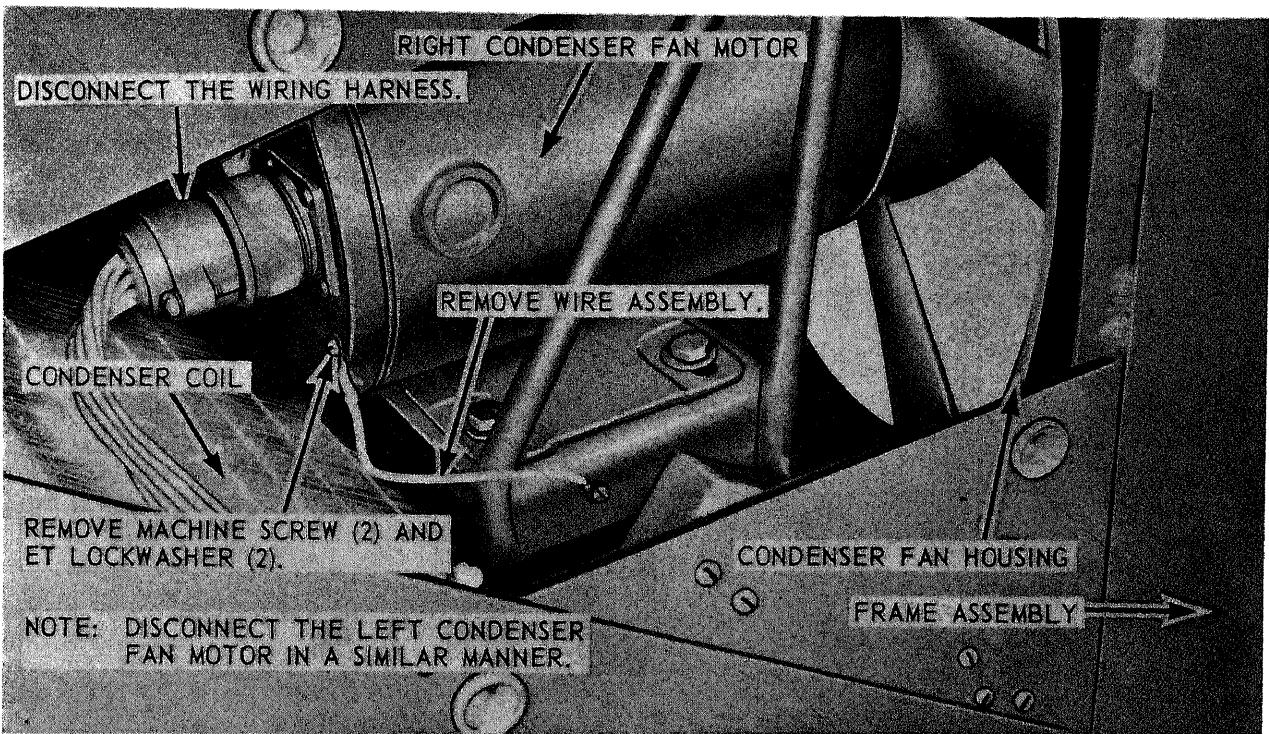
- (1) Clean all parts with an approved solvent and dry thoroughly.
- (2) Inspect all parts for cracks, nicks, breaks, wear, and other damage.
- (3) Repair or replace all unserviceable parts.

*d. Reassembly.* Reassemble fan motor, fan

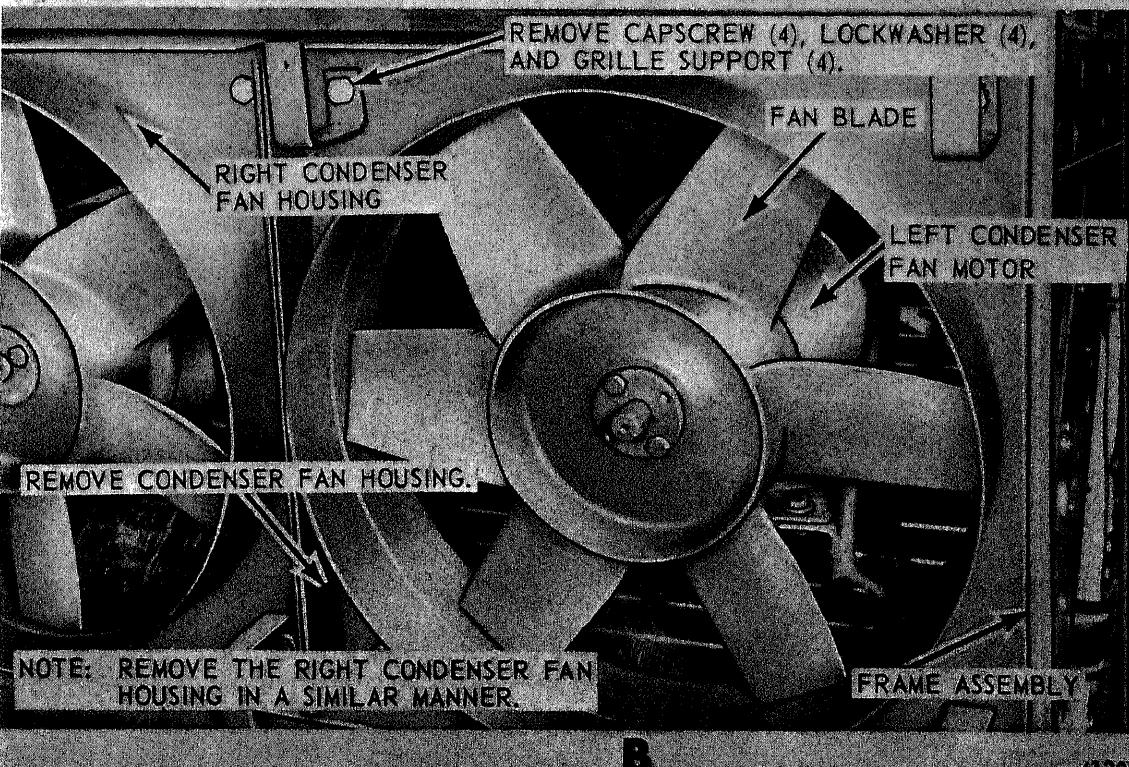
blade, and condenser fan housing in reverse of instructions on figure 3-16.

*e. Installation.*

- (1) Install condenser fan housing, with motor and fan blade, in reverse of the instructions on figure 3-16.
- (2) Install lower left side panels and lower right side panels (para 3-29).
- (3) Install condenser grille assembly (para 3-33).



A



B

4120-216-12/26

A. Disconnect fan motor wiring harness.

B. Fan housing.

Figure 3-15. Condenser fan housing and motor, removal and installation.

### 3-36. Evaporator Fan Belts and Sheaves

#### a. Removal.

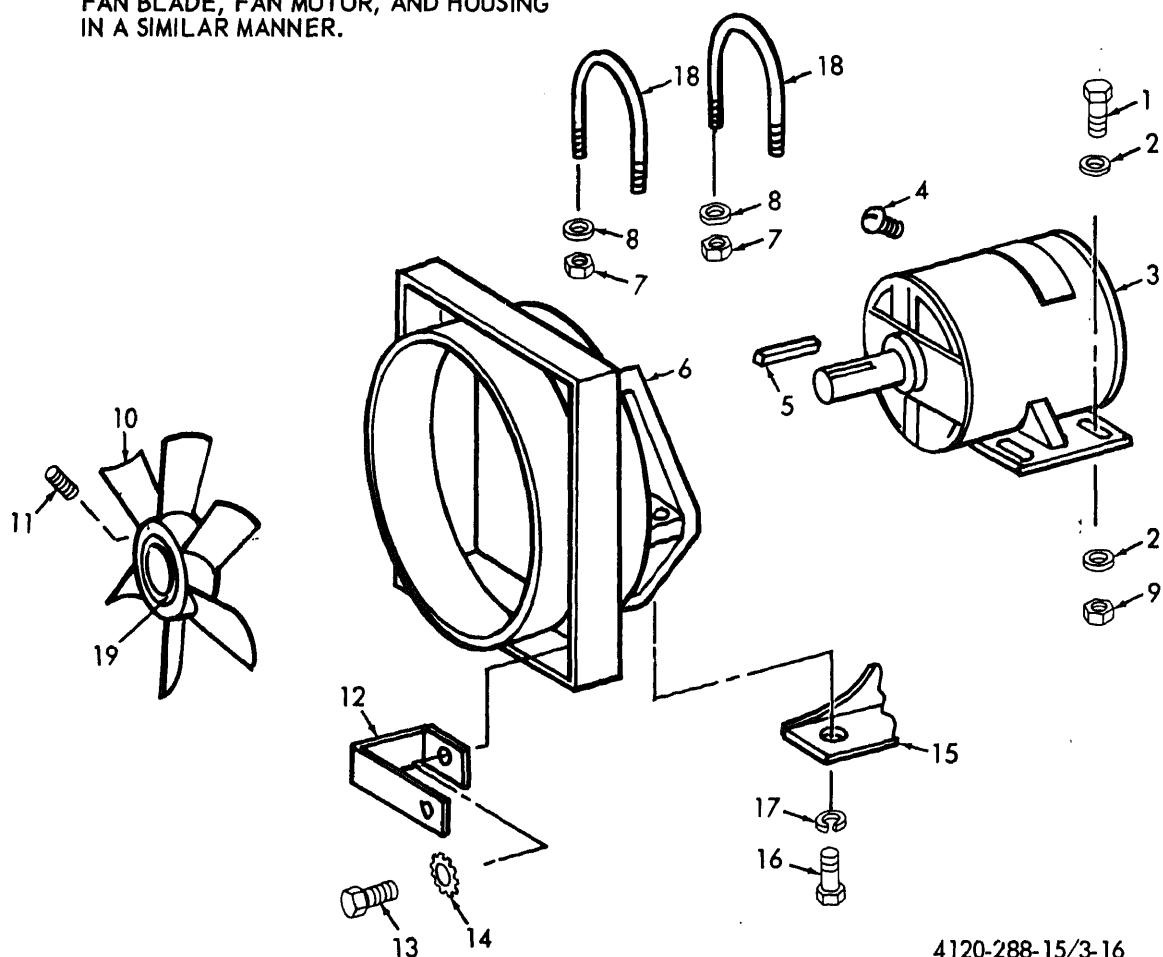
- (1) Remove filter panel assembly (para 3-28).
- (2) Remove upper right side panel (para 3-29).
- (3) Remove fan belts and sheave as instructed in figure 3-17.

b. Disassembly. Disassemble the driven sheave and adjustable drive sheave as instructed on figure 3-18.

#### c. Cleaning, Inspection, and Repair.

- (1) Clean all parts with an approved solvent and dry thoroughly.
- (2) Inspect all parts for cracks, breaks, nicks, wear, and other damage.
- (3) Repair or replace unserviceable parts.

NOTE: DISASSEMBLE THE REMAINING CONDENSER FAN BLADE, FAN MOTOR, AND HOUSING IN A SIMILAR MANNER.



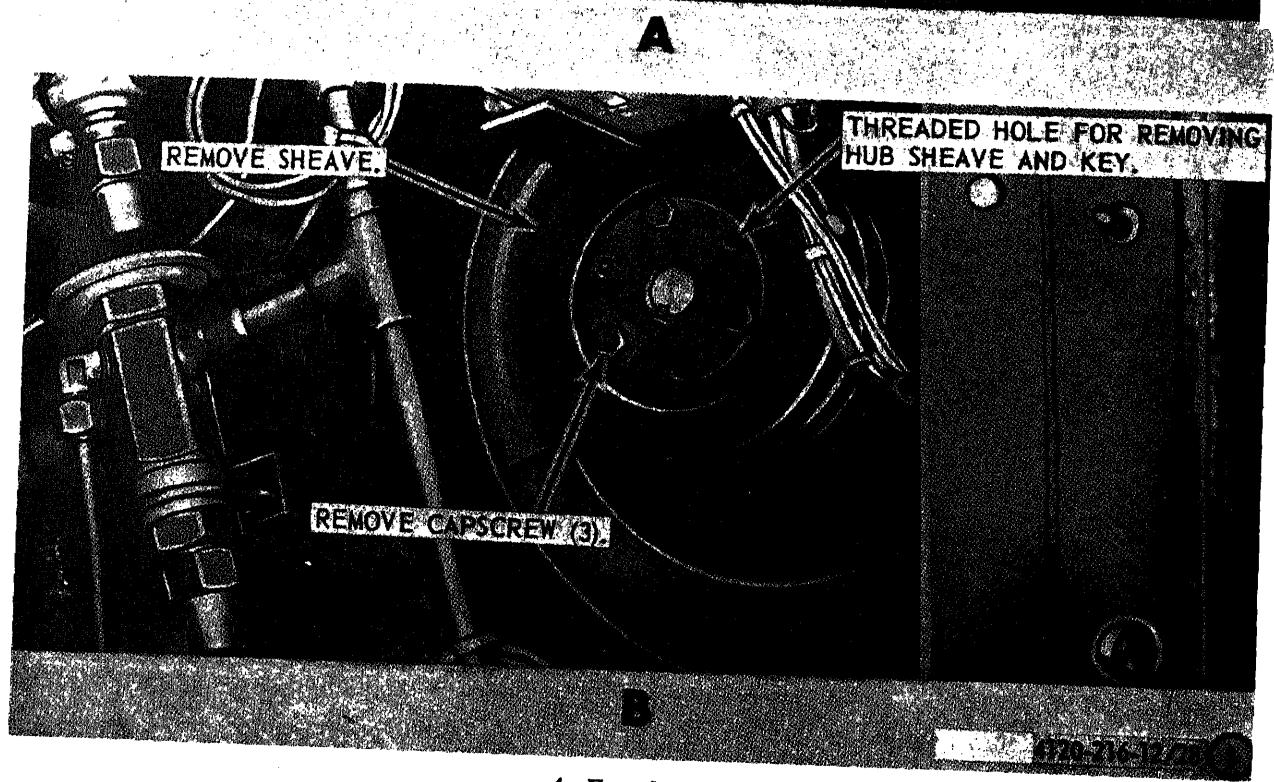
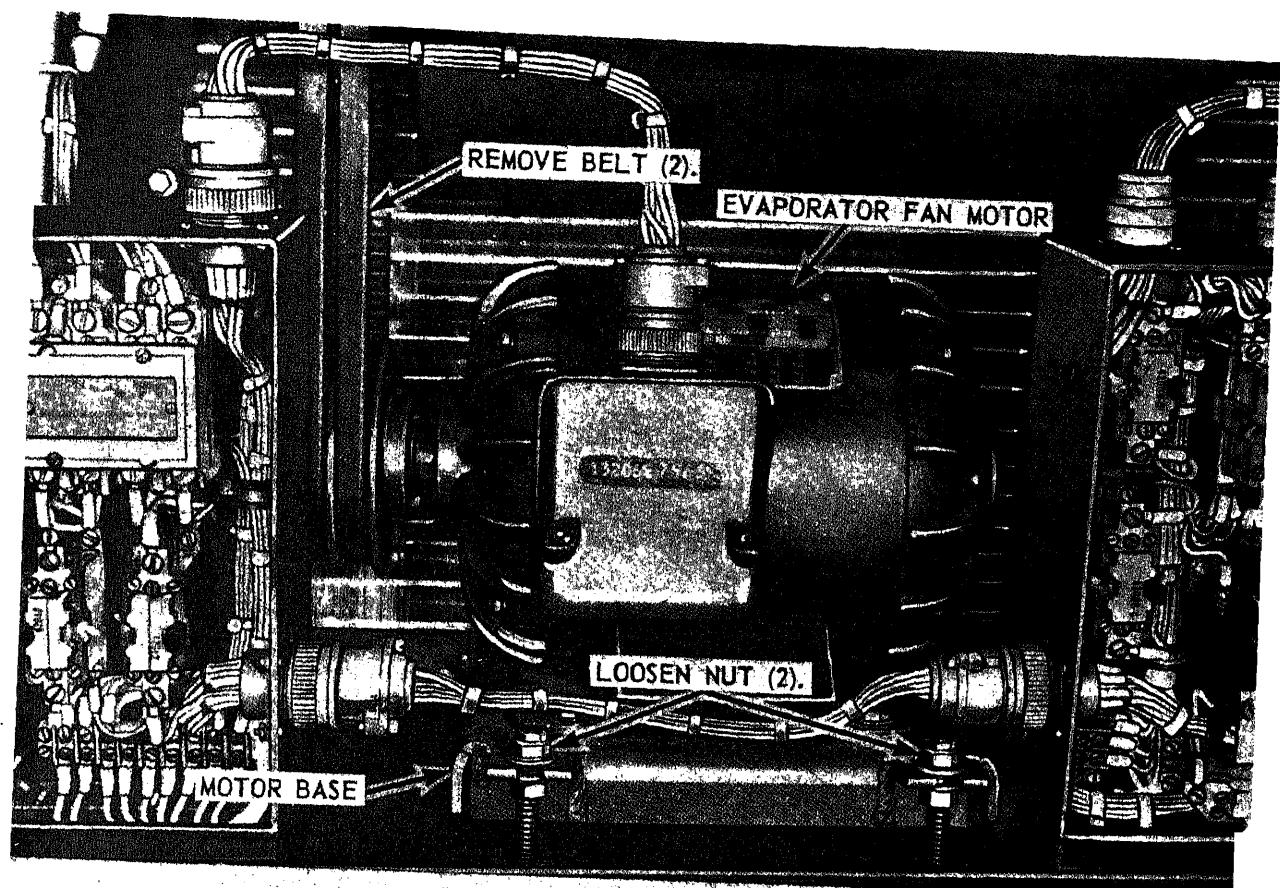
4120-288-15/3-16

1 Capscrew (4)  
2 Flatwasher (8)  
3 Condenser fan motor  
4 Machine screw (4)  
5 Machine key  
6 Condenser fan housing  
7 Nut (4)

8 Washer (4)  
9 Nut (4)  
10 Fan blade  
11 Capscrew (2)  
12 Grille support (6)  
13 Capscrew (8)  
14 Lockwasher (8)

15 Bracket  
16 Capscrew (2)  
17 Lockwasher (2)  
18 U-Bolt (2)  
19 Bushing, fan

Figure 3-16. Condenser fan blade, motor and housing, exploded view.



A. Fan sheave.

B. Evaporator fan drive belts and motor sheave.

Figure 3-17 ①. Evaporator fan drive belts and sheaves, removal and installation.

*d. Reassembly.* Reassemble the adjustable drive sheave and driven sheave in reverse of instructions on figure 3-18.

*Note.* Be sure that the grooves are adjusted to fit the drive belts to be installed.

*e. Installation.*

(1) Install adjustable drive sheave on evaporator fan motor shaft and the driven sheave on evaporator fan shaft in reverse of the instructions on figure 3-17.

*Note.* Be sure that the grooves in the sheaves are properly aligned to prevent excessive drive belt wear.

*Note.* Disassemble the remaining condenser fan blade, fan motor, and housing in a similar manner.

- (2) Install the fan belts on the evaporator fan driven sheave and the adjustable drive sheave as instructed on figure 3-17.
- (3) Adjust belts (para 3-10).
- (4) Install upper right side panel (para 3-29).

(5) Install filter panel assembly (para 3-28).

**3-37. Evaporator Fan Motor and Major Base**

*a. Removal.*

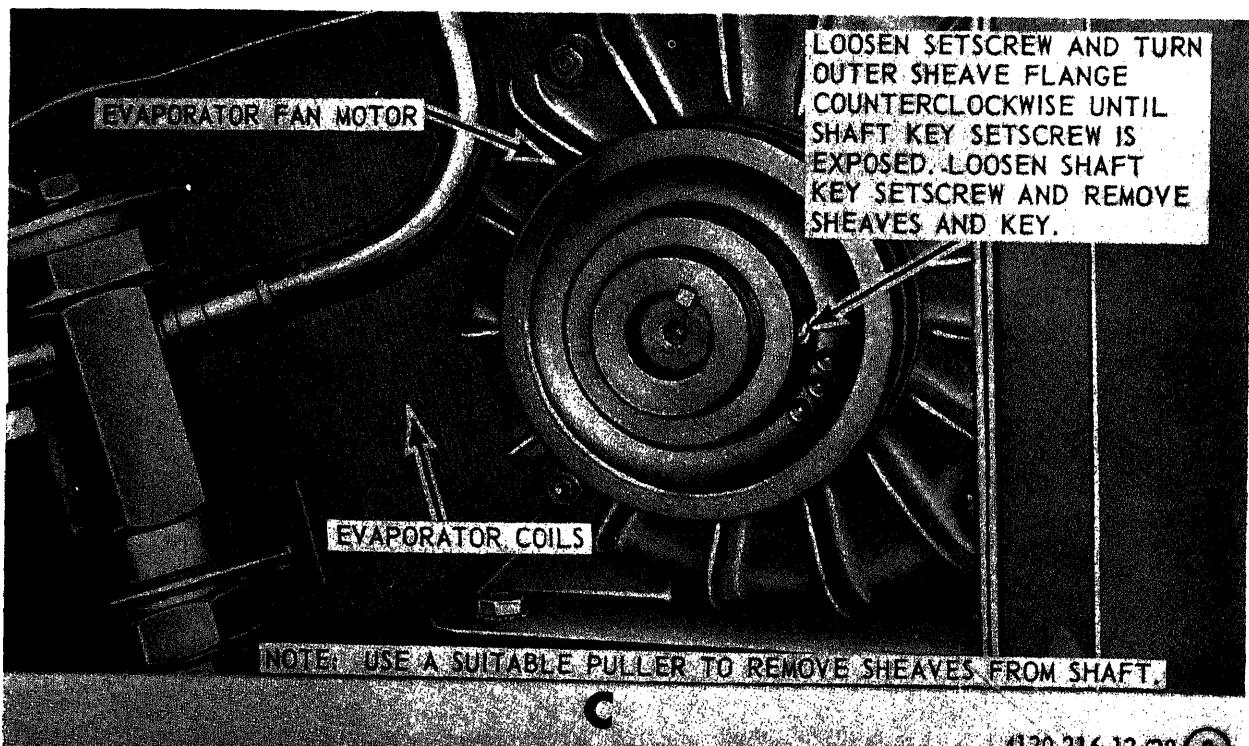
- (1) Remove fan drive belts from adjustable sheave on evaporator fan motor (para 3-36).
- (2) Remove upper left side panel (para 3-29).
- (3) Remove evaporator fan drive motor and motor base from evaporator as instructed on figure 3-19.

*Note.* Do not attempt to remove the evaporator fan motor and motor base as an assembly.

*b. Cleaning, Inspection, and Repair.*

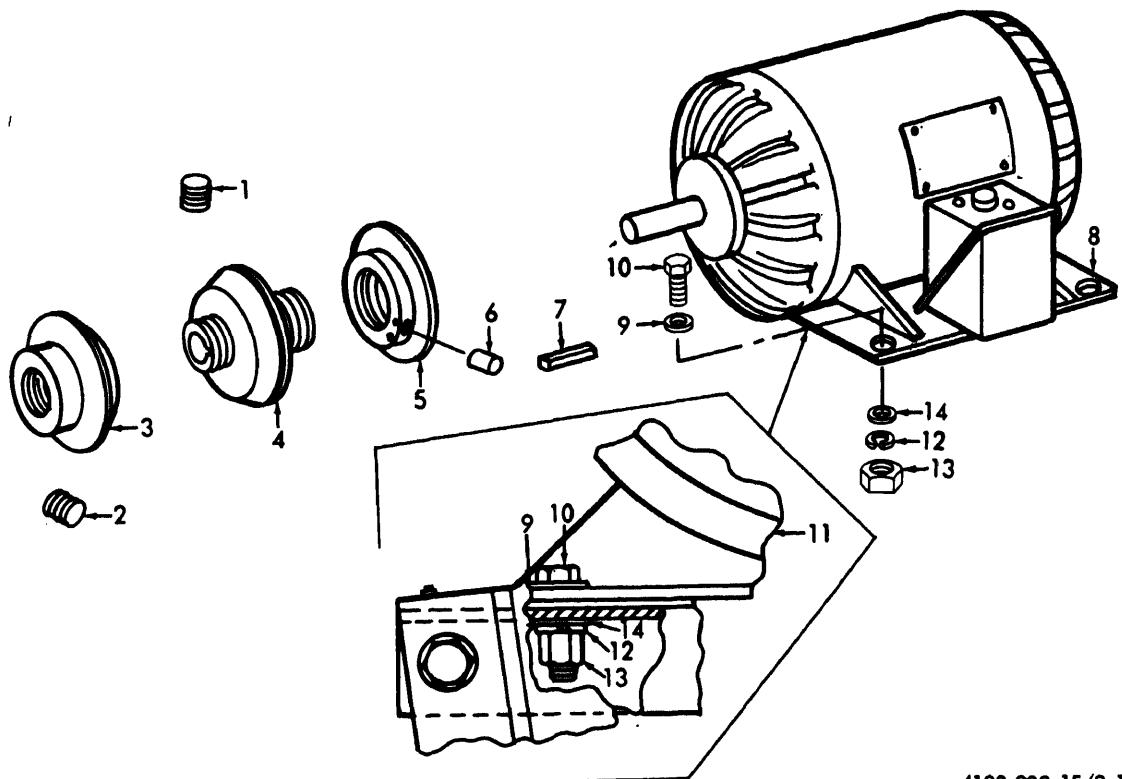
- (1) Clean all parts with an approved solvent and dry thoroughly.
- (2) Inspect for cracks, nicks, breaks, wear, and damaged parts.
- (3) Repair or replace unserviceable parts.

*c. Installation.*



4120-216-12/28 2

*C. Motor sheave removal.*  
Figure 3-17 ②.—Continued.



4120-288-15/3-18

- 1 Setscrew
- 2 Setscrew
- 3 Sheave, outer flange
- 4 Sheave, center flange
- 5 Sheave, inner flange

- 6 Setscrew
- 7 Key
- 8 Mount
- 9 Washer, flat (4)
- 10 Capscrew (6)

- 11 Evaporator fan motor
- 12 Washer, lock (4)
- 13 Nut, self locking (6)
- 14 Washer, flat (12)

Figure 3-18. Driven sheave and adjustable sheave, exploded view.

- (1) Install motor base and evaporator fan motor in reverse as instructed on figure 3-19.
- (2) Install the upper left side panel (para 3-29).
- (3) Install and adjust fan belts (para 3-10).

### 3-38. Evaporator Fan Housing

*a. Removal.*

- (1) Remove upper left side panel (para 3-29).
- (2) Remove fan belts and sheaves (para 3-36).
- (3) Remove evaporator fan motor and base (para 3-37).
- (4) Disconnect wiring harness, lay control box in evaporator drip pan, and

remove evaporator fan housing as instructed on figure 3-20.

*b. Disassembly.* Disassemble evaporator fan housing as instructed on figure 3-21.

*c. Cleaning, Inspection, and Repair.*

- (1) Clean all parts with an approved solvent and dry thoroughly.
- (2) Inspect all parts for cracks, breaks, wear, and other unserviceable conditions.
- (3) Repair or replace all damaged parts.

*d. Reassembly.* Reassemble evaporator fan housing in reverse of instructions on figure 3-21.

*e. Installation.*

(1) Install evaporator fan housing and control box and reconnect wiring

**CAUTION: DO NOT DAMAGE THE EVAPORATOR COIL WHEN REMOVING THE EVAPORATOR MOTOR.**

6. TURN THE EVAPORATOR FAN DRIVE MOTOR ON THE BASE AND REMOVE FROM AIR CONDITIONER.

1. DISCONNECT WIRING HARNESS.

2. DISCONNECT AND REMOVE WIRING HARNESS.

7. REMOVE CAPSCREW (8).

5. REMOVE SCREW (4).

4. LIFT MOTOR BASE AND BLOCK IN A RAISED POSITION. REMOVE LOWER SELF-LOCKING NUT FROM EACH T-BOLT. POSITION T-BOLTS FLAT IN EVAPORATOR PAN.

8. REMOVE MOTOR BASE.

3. REMOVE SELF-LOCKING NUT AND FLAT WASHER (2).

4120-216-12/30

*Figure 3-19. Evaporator fan motor and base, removal and installation.*

harness assembly in reverse of instructions on figure 3-20.

(2) Install the evaporator fan motor and base (para 3-37).

(3) Install and adjust fan belts and sheaves (para 3-36).

(4) Install upper left side panel (para 3-29).

NOTE: TAG WIRING HARNESS CONNECTOR (4), AS REMOVED TO ASSURE  
CORRECT INSTALLATION. MOVE WIRING HARNESS ASIDE.

REMOVE CONNECTOR (4).

REMOVE MACHINE SCREW (4).

FRAME ASSEMBLY

COMPRESSOR AND CONDENSER  
FAN MOTORS CONTROL BOX

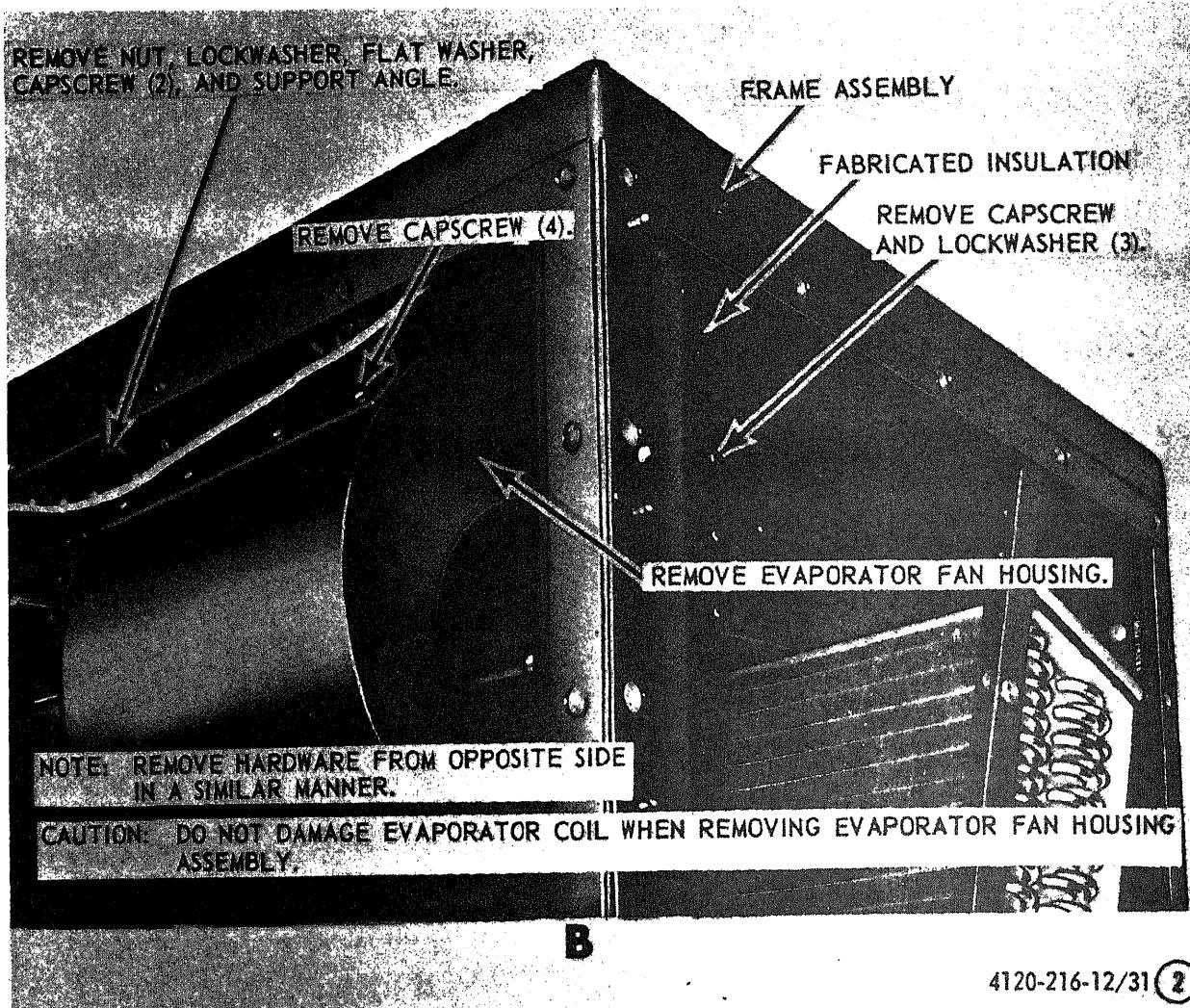
NOTE: LAY THE CONTROL BOX FLAT IN THE EVAPORATOR PAN.

A

4120-216-12/31

A. Control box removal.

Figure 3-20 ①. Control box mounting, evaporator fan housing, and support angle, removal and installation.



*B. Housing assembly and support angle.*

*Figure 3-20 ①. Control box mounting, evaporator fan housing, and support angle, removal and installation.*

## Section X. CONDENSATE ASSEMBLY

### 3-39. General

The moisture formed on the evaporator coil drops into evaporator pan and drains through condensate hose and condensate tube secured on left rear corner of the frame assembly. The condensate hose must be kept free of obstruction. Keep evaporator pan and evaporator coil clean to prevent blocking the drain hose assembly.

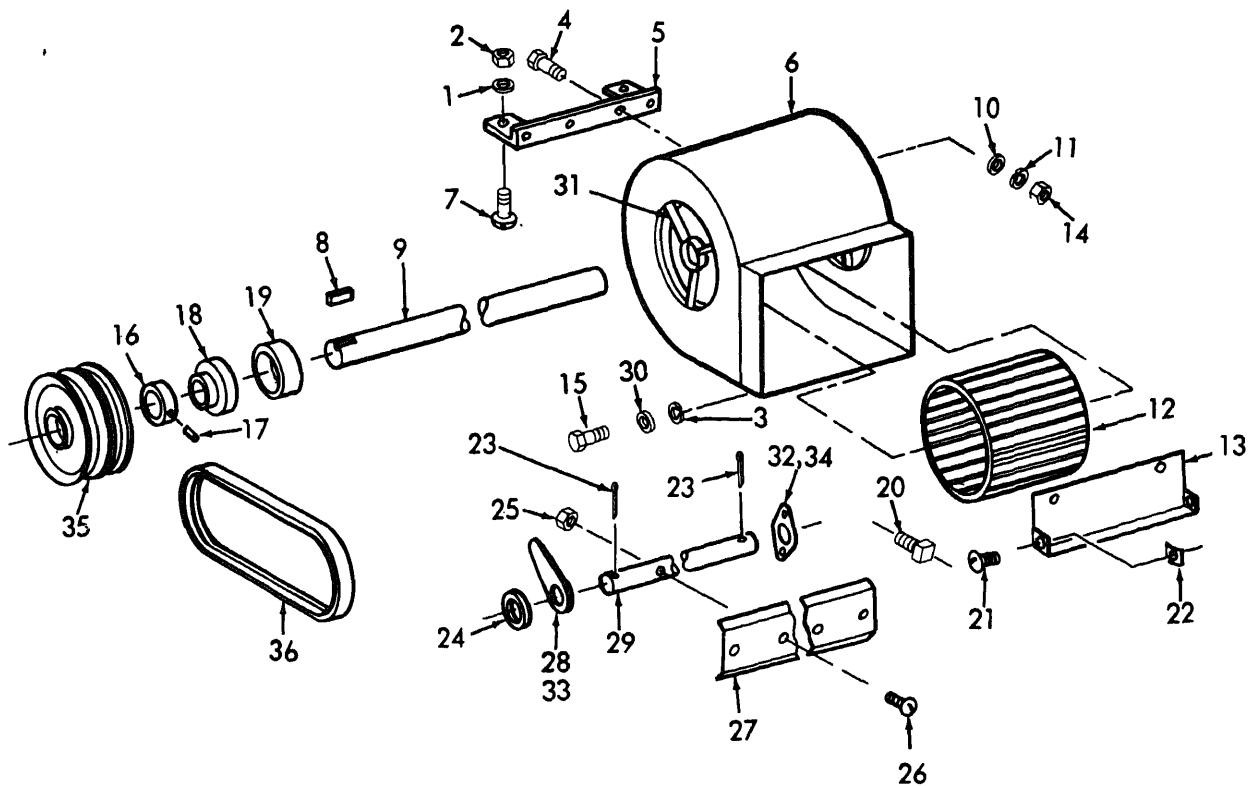
In areas of high humidity, be sure pipe plugs are removed from base of frame assembly and

drain piping or tubing is connected to the condensate pan to remove excess moisture.

### 3-40. Condensate Drain Assembly

#### a. Removal.

- (1) Remove lower front panel and lower left side panel (para 3-29).
- (2) Remove condensate hose assembly, loop clamps, and formed rubber insulation from air conditioner as instructed on figure 3-22.



4120-288-15/3-21

|                     |                           |                          |
|---------------------|---------------------------|--------------------------|
| 1 Washer, flat (4)  | 13 Baffle                 | 25 Nut, selfflocking (4) |
| 2 Nut (2)           | 14 Nut (4)                | 26 Screw, machine (4)    |
| 3 Washer, lock (6)  | 15 Capscrew (6)           | 27 Damper blade          |
| 4 Capscrew (4)      | 16 Collar (2)             | 28 Damper regulator      |
| 5 Angle, support    | 17 Cup point setscrew (2) | 29 Damper shaft          |
| 6 Housing           | 18 Sealed bearing (2)     | 30 Washer (6)            |
| 7 Capscrew (2)      | 19 Bearing shield (2)     | 31 Bracket, bearing      |
| 8 Machine key       | 20 Setscrew, sq. hd. (2)  | 32 Bearing and housing   |
| 9 Shaft             | 21 Screw (4)              | 33 Rivet (2)             |
| 10 Washer, flat (4) | 22 Speed nut (4)          | 34 Rivet (2)             |
| 11 Washer, lock (4) | 23 Pin, cotter (2)        | 35 Sheave                |
| 12 Wheel            | 24 Washer, flat (1)       | 36 Belt, V               |

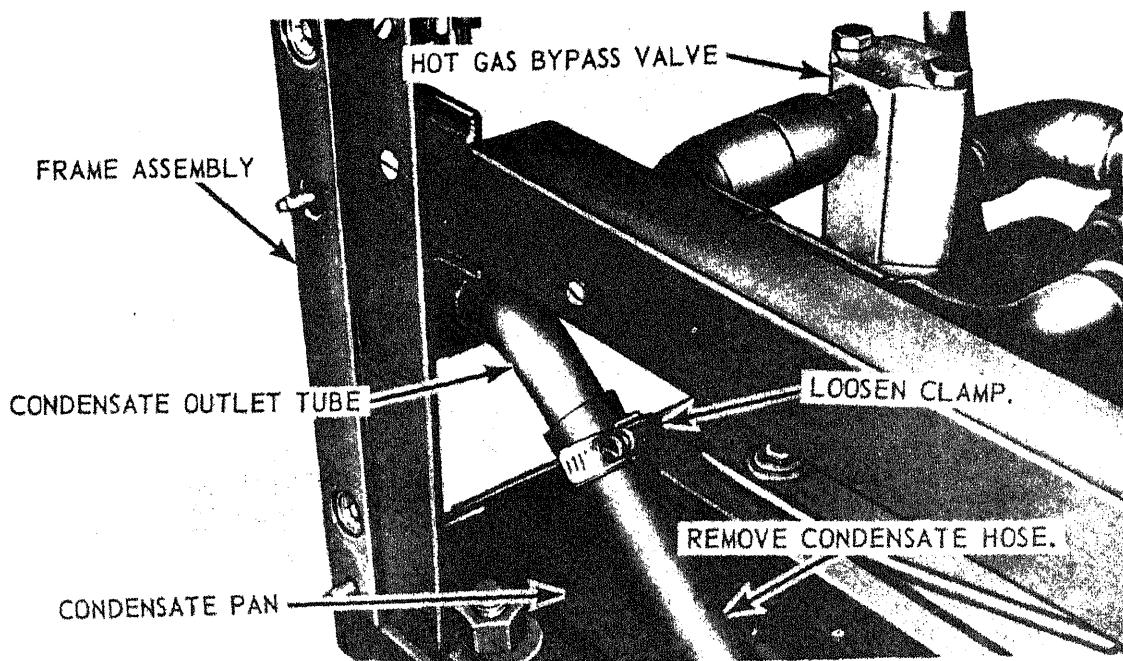
Figure 3-21. Evaporator fan housing, exploded view.

*b. Cleaning, Inspection, and Repair.*

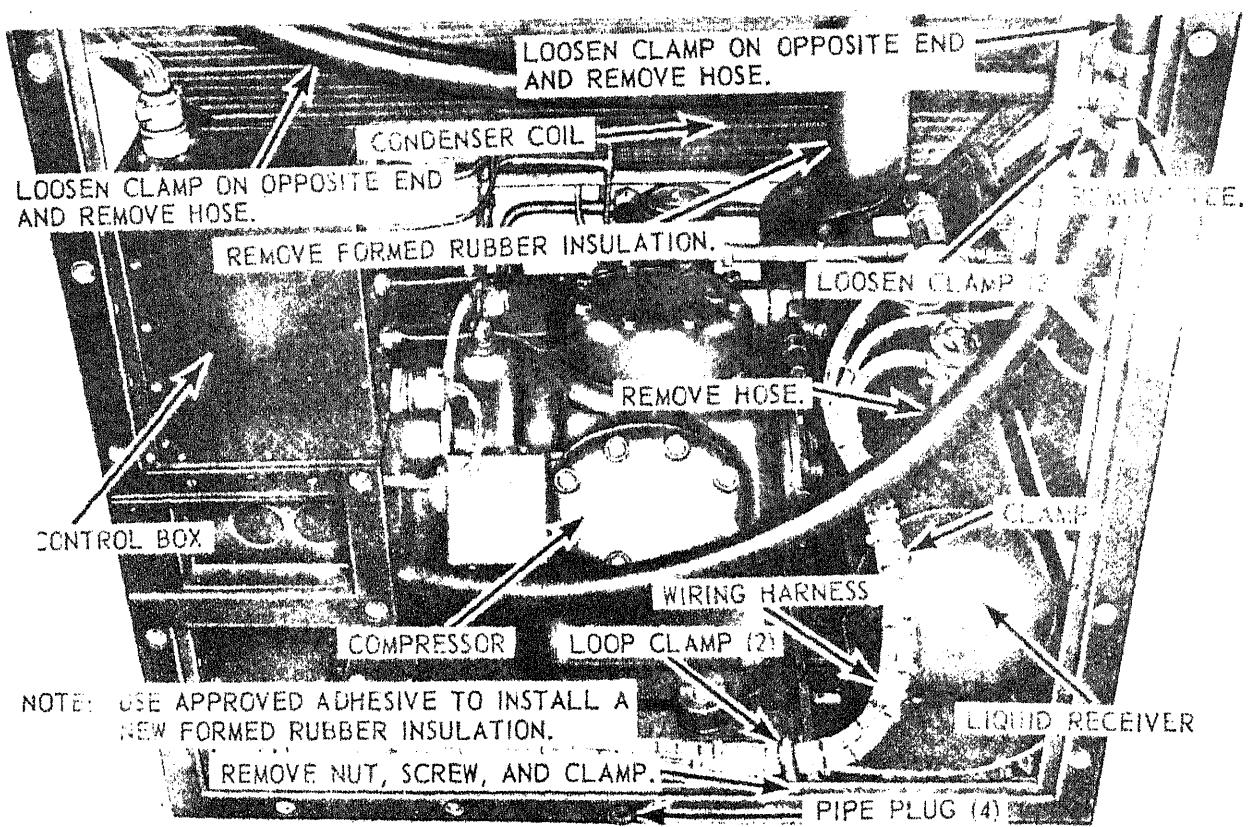
- (1) Clean all parts with an approved solvent and dry thoroughly.
- (2) Inspect all parts for cracks, wear, deterioration, and other damage.
- (3) Repair or replace all unserviceable parts.

*c. Installation.*

- (1) Install condensate hose assembly, loop clamps, and formed rubber insulation on air conditioner in reverse of instructions on figure 3-22.
- (2) Install lower front panel and lower left side panel (para 3-29).



A



B

NOTE: USE APPROVED ADhesive TO INSTALL A  
NEW FORMED RUBBER INSULATION.

REMOVE NUT, SCREW, AND CLAMP.

## Section XI. FUSE HOLDER, CAPACITOR, OVERLOAD RELAY HEATERS, CONDENSER SERVICE SWITCH, AND RESET BUTTON

### 3-41. General

The fuse holder is located in the condenser and compressor control box. There are four fuses, two that complete the circuit between transformer, solenoid valves, low pressure cut-out switch, and the remote control panel. Remaining two fuses are spares. Capacitors are located on rear of the temperature control box and provide a low resistance path to ground for stray currents generated by the main power source. The overload relay heaters are located in the condenser and compressor control box and evaporator control box. Each heater consists of a coil of resistance wire, which, if overheated, causes the relay contact points to open. This breaks circuit temporarily until heater cools and prevents overload on components of the electrical system. The condenser service switch is located on front lower panel and controls the compressor and condenser fan motors and is used to shut off motors while servicing unit. The reset button is located on front panel below filter and resets the circuit breaker.

### 3-42. Fuses and Fuse Holder

#### a. Removal.

- (1) Remove filter panel assembly (para 3-28).
- (2) Remove fuses and fuse holder as instructed on figure 3-23.

*b. Cleaning and Inspection.* Clean all parts with an approved cleaning solvent. Inspect all parts for defects and damage. Replace defective or damaged parts.

#### c. Installation.

- (1) Install fuses and fuse holder in reverse of instructions on figure 3-23.
- (2) Install filter panel assembly (para 3-28).

### 3-43. Capacitors

#### a. Removal.

- (1) Remove lower right side panel (para 3-29).

- (2) Remove capacitors as instructed on figure 3-24.

*b. Cleaning, Inspection, and Test.* Clean all parts with an approved cleaning solvent. Inspect capacitors for defects and damage. Test capacitors with a capacitor tester. Replace defective, damaged, or unserviceable capacitors.

#### c. Installation.

- (1) Install capacitors in reverse of instructions on figure 3-24.
- (2) Install lower right side panel (para 3-29).

### 3-44. Overload-Relay Heaters

#### a. Removal.

- (1) Remove filter panel assembly (para 3-28).
- (2) Remove overload relay heaters as instructed on figure 3-25.

*b. Cleaning and Inspection.* Clean all parts with an approved cleaning solvent. Inspect relay heaters for defects and damage. Using a suitable continuity tester, test heaters for open winding. Replace defective or damaged parts.

#### c. Installation.

- (1) Install overload relay heaters in reverse of instructions on figure 3-25.  
*Caution:* Be sure to replace heater with a heater having an identical number.
- (2) Install filter panel assembly (para 3-28).

### 3-45. Condenser Service Switch

#### a. Removal.

- (1) Remove condenser screen assembly (para 3-33).
- (2) Remove condenser service switch as instructed on figure 3-26.

*b. Cleaning and Inspection.* Clean all parts with an approved cleaning solvent. Inspect

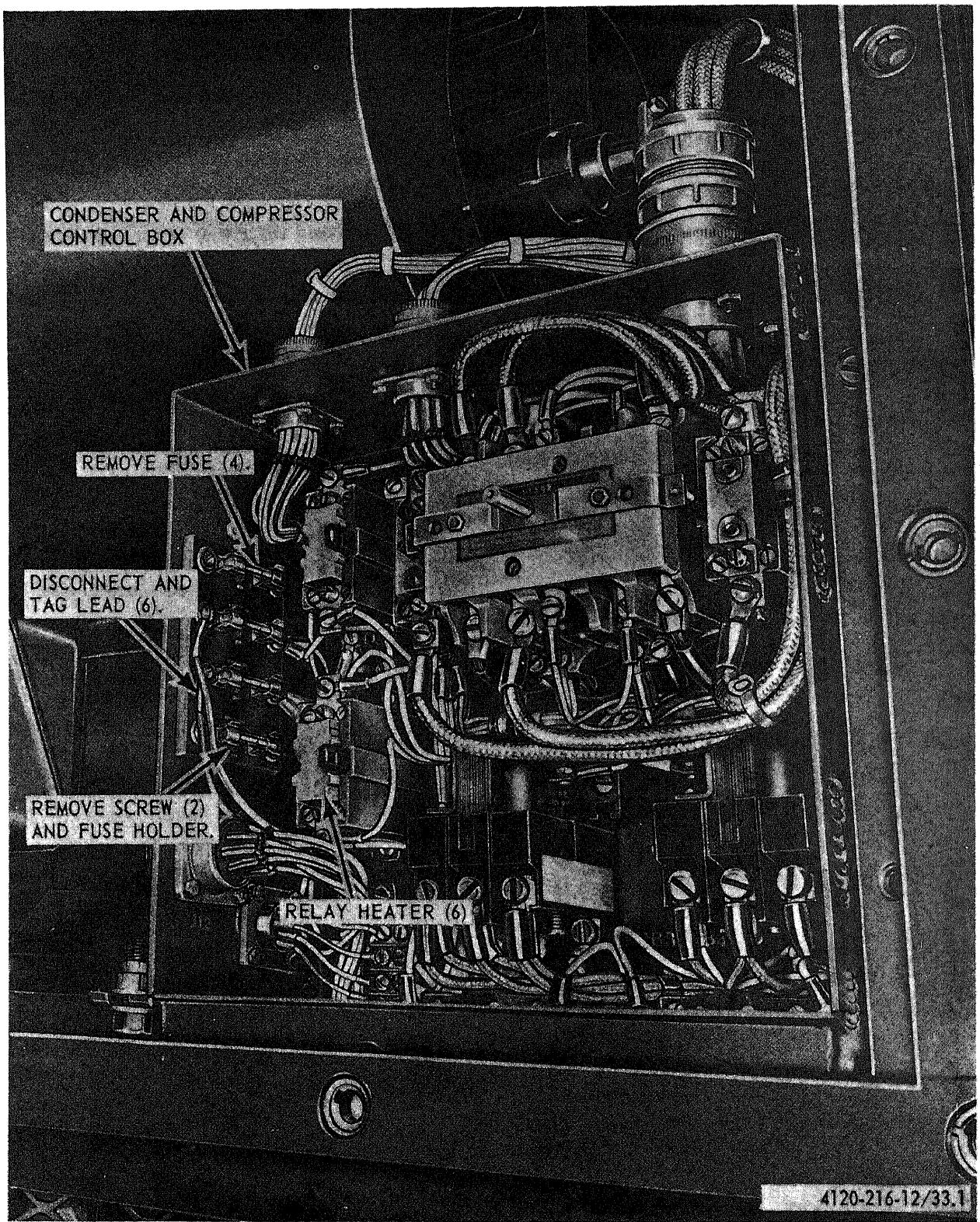
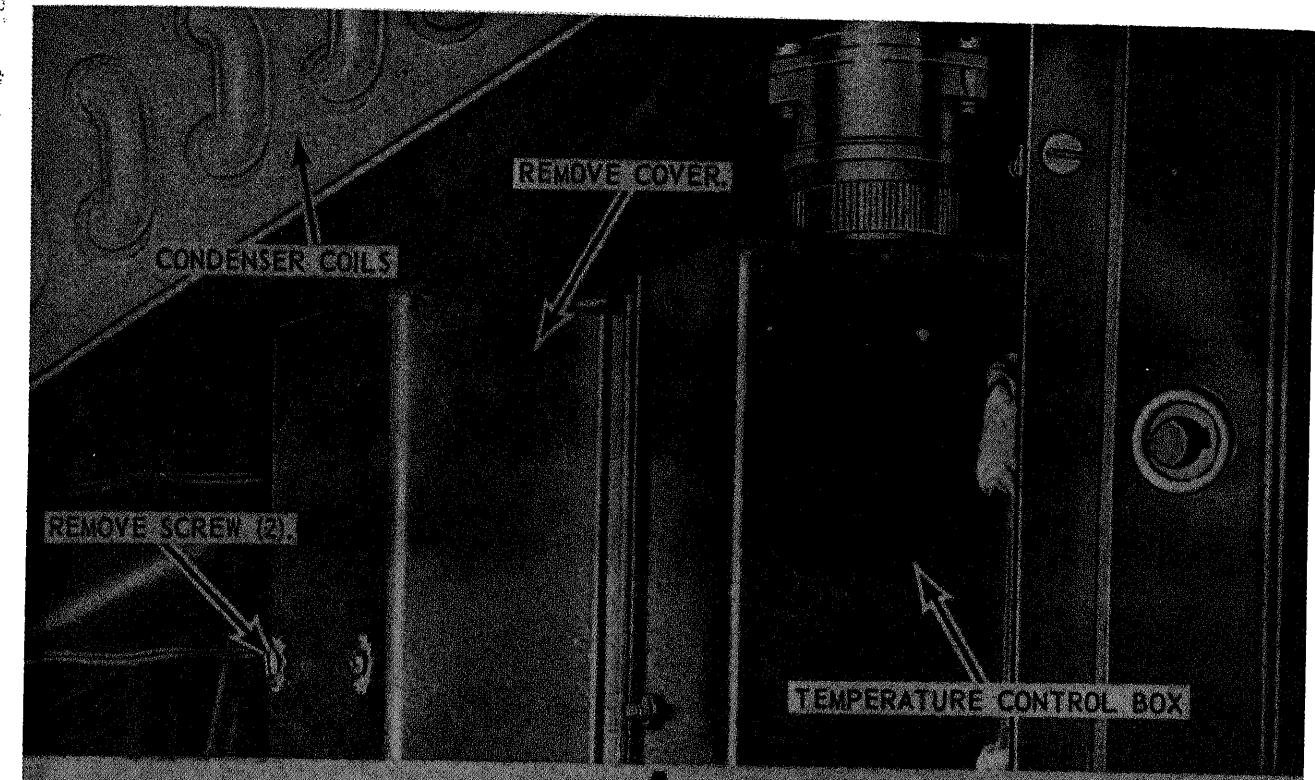
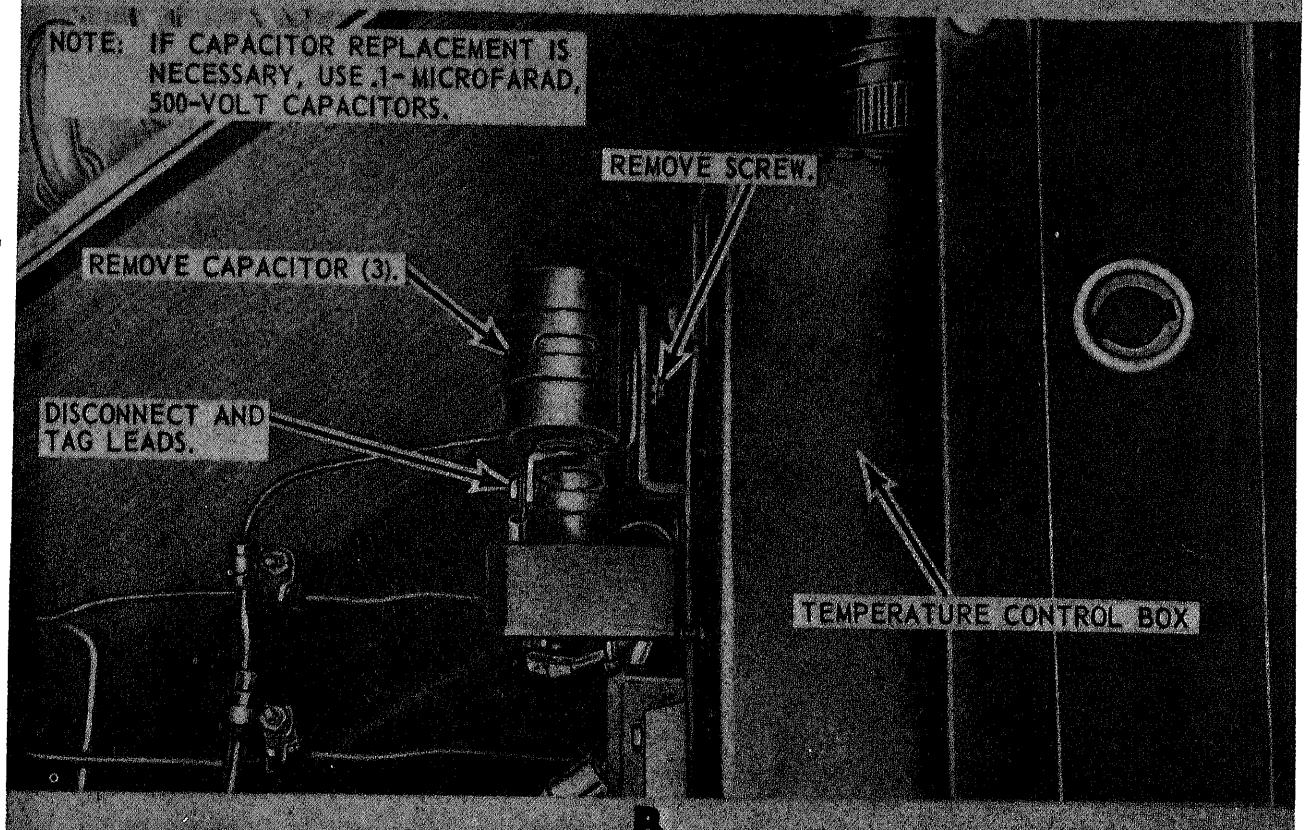


Figure 3-23. Fuse holder, removal and installation.



**A**



**B**

*A. Cover, removal.  
B. Capacitors, removal.  
Figure 3-24. Capacitors, removal and installation.*

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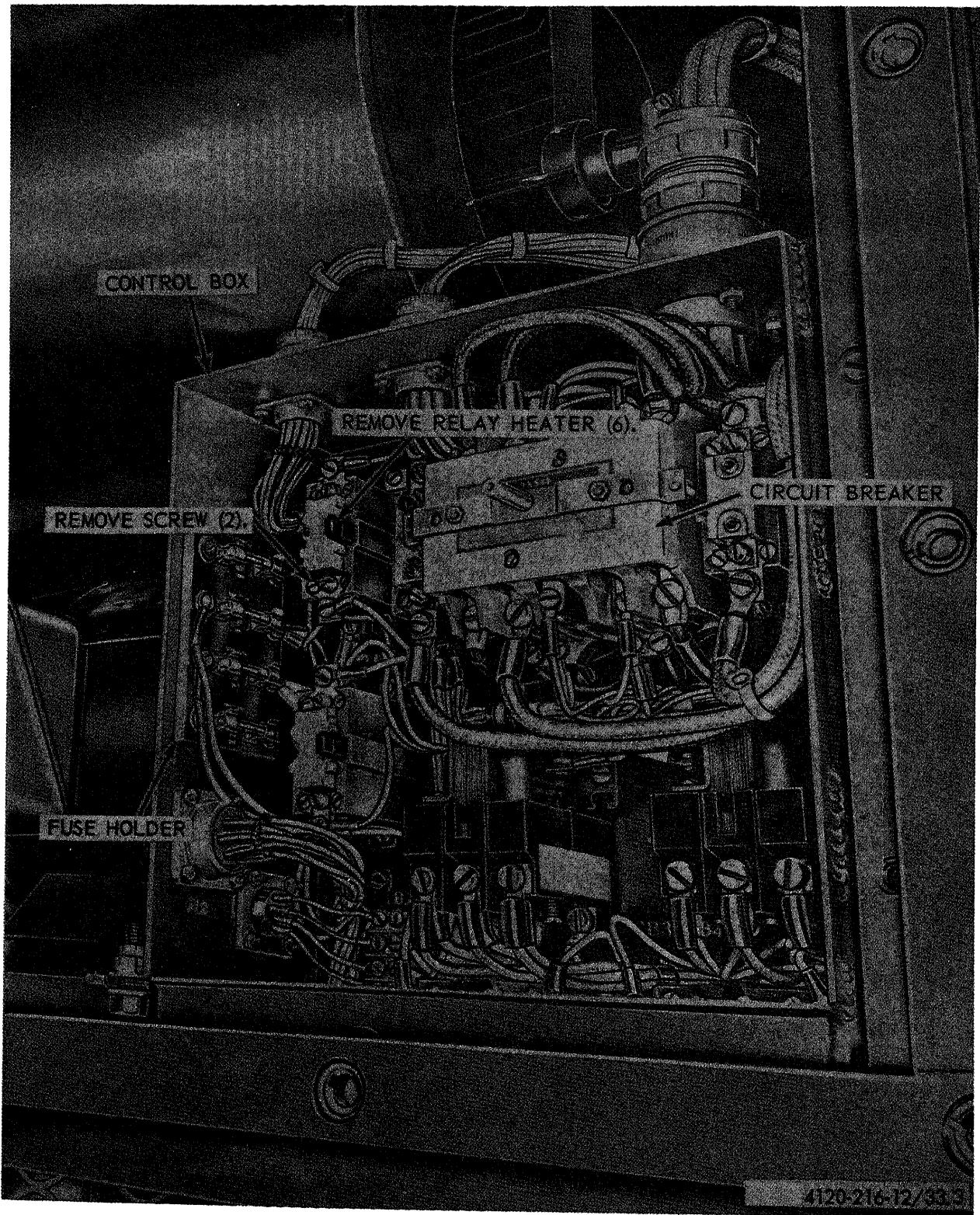


Figure 3-25. Overload relay heaters, removal and installation.

switch for defects and damage. Replace a defective or damaged switch.

*c. Installation.*

- (1) Install condenser service switch in reverse of instructions on figure 3-26.
- (2) Install condenser screen assembly (para 3-33).

**3-46. Reset Button**

*a. Removal.*

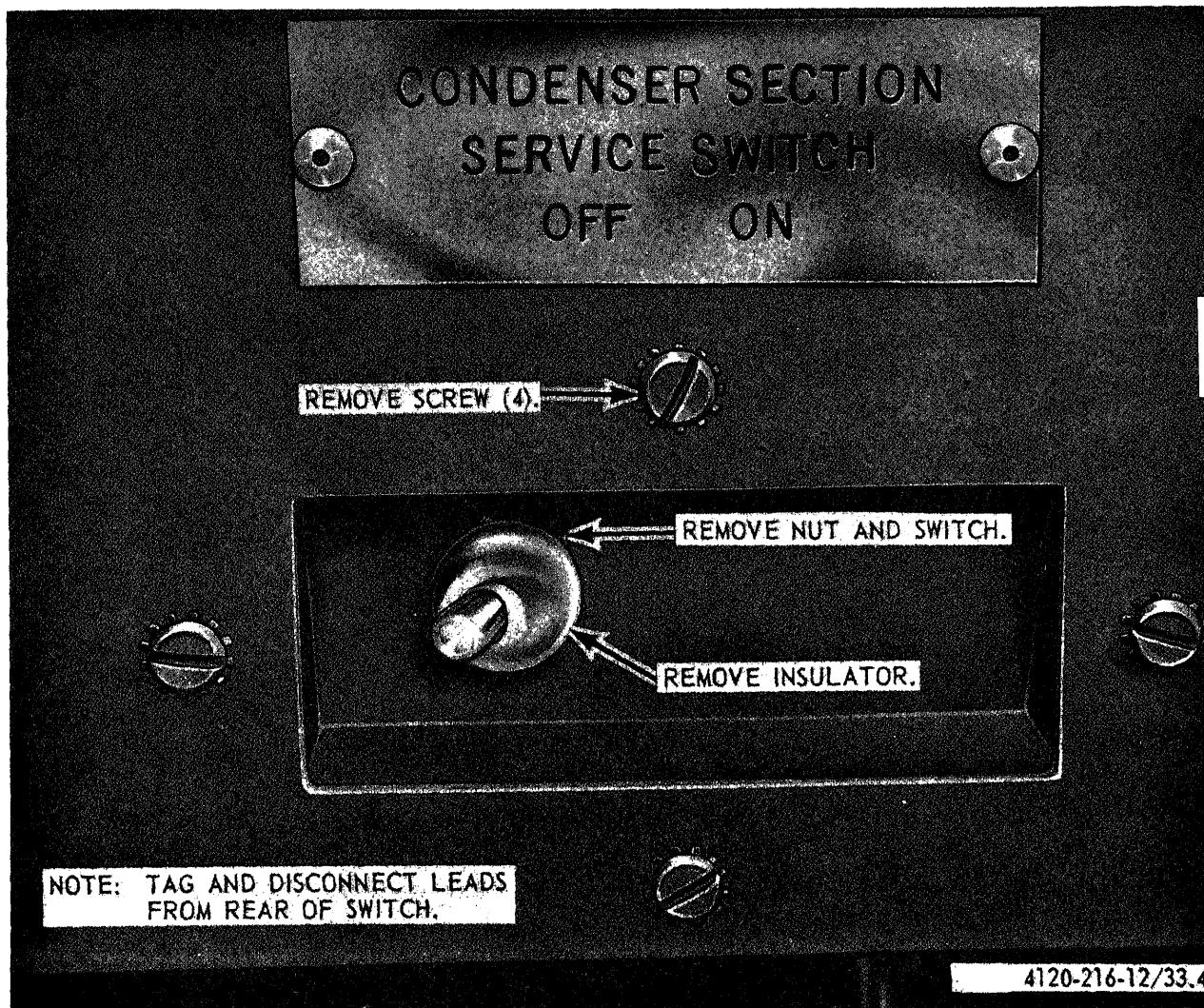
- (1) Remove filter panel assembly (para 3-28).

- (2) Remove reset button as instructed on figure 3-27.

*b. Cleaning and Inspection.* Clean all parts with an approved cleaning solvent. Inspect all parts for defects and damage. Replace defective or damaged parts.

*c. Installation.*

- (1) Install reset button in reverse of instructions on figure 3-27.
- (2) Install filter panel assembly (para 3-28).



*Figure 3-26. Condenser service switch, removal and installation.*

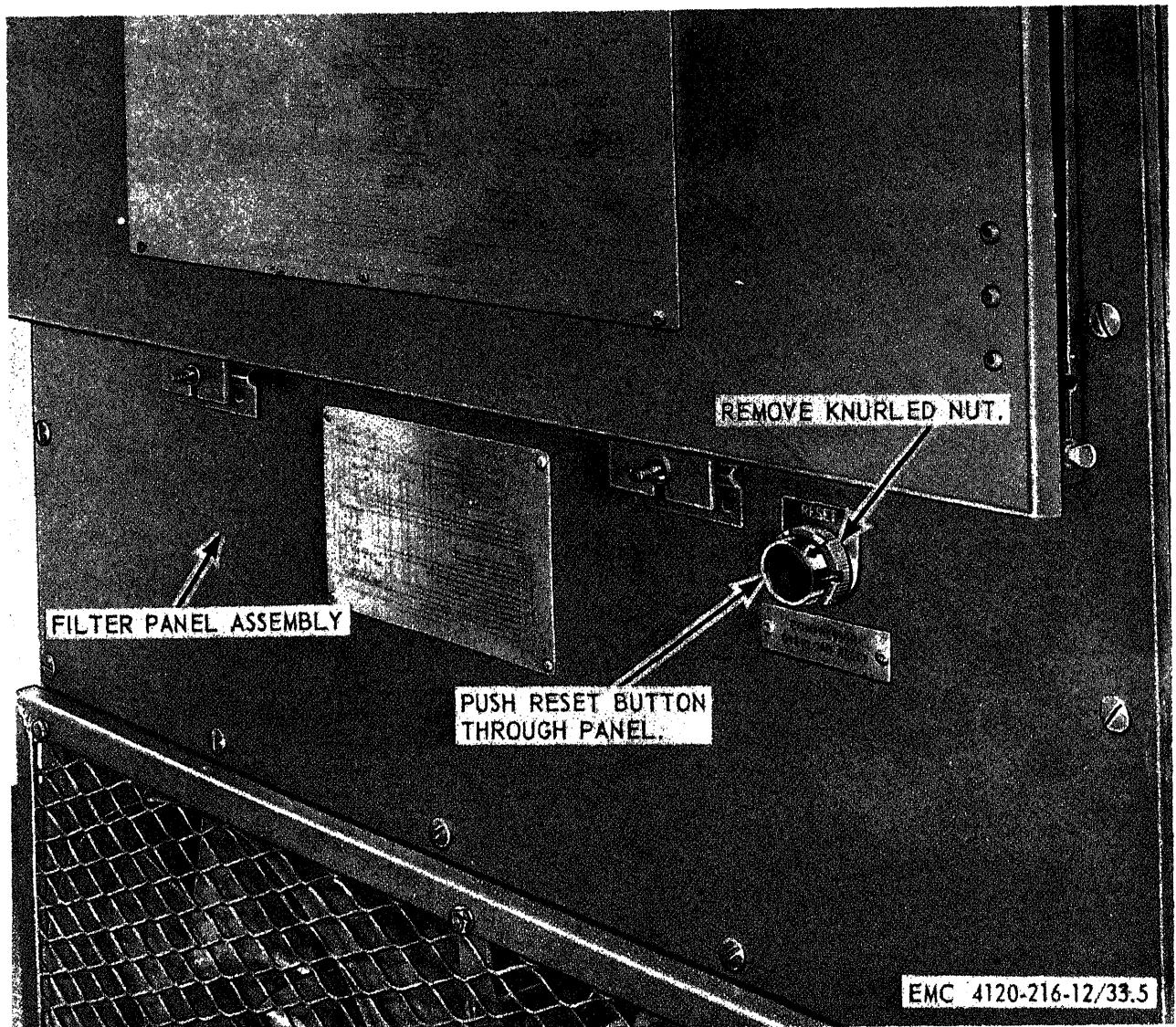


Figure 3-27. Reset button, removal and installation.

## CHAPTER 4

# SHIPMENT AND LIMITED STORAGE AND DEMOLITION TO PREVENT ENEMY USE

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### Section I. SHIPMENT AND LIMITED STORAGE

#### 4-1. Preparation of Equipment for Shipment

a. *General.* Detailed instructions for the preparation of the air conditioner for domestic shipment are outlined within this paragraph. Preservation will be accomplished in sequence that will not require the operation of previously preserved components.

b. *Inspection.* The air conditioner will be inspected for any unusual conditions such as damage, rusting, accumulation of water, and pilferage. Inspection of the individual components and assemblies will be as outlined on the "Preventive Maintenance Checks and Services, Quarterly" in this manual.

c. *Cleaning and Drying.* Clean all surfaces of the air conditioner with approved cleaning solvent and dry thoroughly. Refer to TM 38-230.

d. *Painting.* Remove rust and corrosion from areas to be painted by sanding. Paint the exposed and sanded surfaces. (TM 9-213).

e. *Depreservation Guide.* DA Form 2258 (Depreservation Guide for Vehicles and Equipment).

(1) A properly annotated depreservation guide will be completed concurrently with preservation for each item of mechanical equipment. Any peculiar requirements will be outlined in the blank space on the form. The completed depreservation guide will be placed with the equipment in a waterproof envelope marked "Depreservation Guide," and fastened in

a conspicuous location on or near the operator's controls.

(2) Prior to placing equipment in operation or to the extent necessary for inspection, depreservation of the item will be performed as outlined on the depreservation guide.

f. *Refrigeration System.* Refer pumping down system to direct support maintenance personnel.

g. *Marking.* The markings will conform to MIL-STD-129.

h. *Power Cable.* The power cable will be disconnected, coiled, and tied securely to the metal frame inside the cabinet. The rear upper access panel will then be reinstalled and the cable opening sealed with tape.

i. *Basic Issue Items.* All basic issue items will be packed with the publications in a canvas bag mounted on the equipment.

*Note.* If packing is required to provide adequate protection against damage during shipment, refer to TM 38-230 for guidance in crate fabrication.

#### 4-2. Loading Equipment for Shipment

Use appropriate materials handling equipment of sufficient capacity to lift the air conditioner onto the carrier. Block and tie the unit to the carrier to assure that it will not move during transit.

#### 4-3. Preparation of Equipment for Limited Storage

a. Detailed instructions for preparation of

the air conditioner for limited storage are provided in paragraph 4-1. Limited storage is defined as storage not to exceed six (6) months.

b. Every effort should be made to provide covered storage for the air conditioner. If this is impossible, select a firm, level, well-drained storage location, protected from prevailing winds. Position the air conditioner on heavy planking, cover with a tarpaulin or other suitable waterproof covering. Secure in a manner

that will provide the air conditioner maximum protection from the elements.

#### 4-4. Inspection and Maintenance of Equipment in Limited Storage

Every 90 days, the air conditioner will be inspected as outlined in "Preventive Maintenance Checks and Services, Quarterly." After each inspection period, the air conditioner will be represerved as outlined in paragraph 4-1.

### Section II. DEMOLITION OF MATERIAL TO PREVENT ENEMY USE

#### 4-5. General

When capture or abandonment of the air conditioner is eminent, the responsible unit commander must make the decision either to destroy the equipment or to render it inoperative. Based on this decision, orders are issued which cover the desired extent of demolition. Whatever method of demolition is employed, it is essential to destroy the same vital parts of air conditioner and all corresponding repair parts. When the lack of time or personnel prevents complete destruction of the equipment, the following priorities will be used in the demolition of essential parts. Priorities for demolition:

| Priorities | Parts                               |
|------------|-------------------------------------|
| 1          | Evaporator coil and condenser coils |
| 2          | All motors                          |
| 3          | Compressor                          |
| 4          | Tubing                              |
| 5          | Cables and wiring                   |

#### 4-6. Demolition to Render the Equipment Inoperative

a. *Demolition by mechanical means.* Use hammers, crowbars, picks, axes, or any other heavy tools which may be available.

b. *Demolition by misuse.* Perform the following steps to render the air conditioner inoperative.

- (1) Loosen compressor discharge and suction valve attaching bolt and run compressor until it fails.
- (2) Bend fan blades housing to prevent fan blades from turning.

#### 4-7. Demolition by Explosive or Weapons Fire

a. *Explosive.* Place as many of the charges as the situation permits, and detonate them simultaneously with a detonating cord and a suitable detonator.

b. *Weapons fire.* Fire on the air conditioner, using the heaviest practical weapon available.

#### 4-8. Other Demolition Methods

a. *Scattering and concealment.* Remove all easily accessible parts and wiring, and scatter them through dense foliage, bury them, or throw them in body of water.

b. *Burning.* Pack rags, clothing, or paper under and around the air conditioner. Saturate this packing with gasoline, oil, or diesel fuel, and ignite.

c. *Submersion.* Completely submerge the air conditioner in a body of water to provide water damage and concealment. Salt water does greater damage to metal parts than fresh water.

#### 4-9. Training

All operators should receive thorough training in the demolition of the air conditioner. Refer to FM 5-25. Simulated demolition using all of the methods listed above should be included in the operator-training program. It must be emphasized, in training, that demolition operations are usually necessitated by critical situations when time available for carrying out demolition is limited. For this reason, operators must be thoroughly familiar with all methods of demolition of equipment and must be able to carry out demolition instructions without reference to this or any other manual.

# CHAPTER 5

## DIRECT SUPPORT, GENERAL SUPPORT, AND DEPOT MAINTENANCE INSTRUCTIONS

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### Section I. GENERAL

#### 5-1. Scope

a. These instructions are published for the use of direct support, general support, and depot maintenance personnel maintaining the Keco Air Conditioner Model F-60. They provide information on the maintenance of the equipment, which is beyond the scope of the tools, equipment, personnel, or supplies normally available to using organizations.

b. Report all equipment improvement recommendations as prescribed by TM 38-750.

#### 5-2. Forms and Records

a. DA Form 2258 (Depreservation Guide of Engineer Equipment).

b. For other record and report forms applicable to direct and general support and depot maintenance, refer to TM 38-750.

*Note:* Applicable forms, excluding Standard Form 46 which is carried by the operator, shall be kept in a canvas bag mounted on the equipment.

### Section II. DESCRIPTION AND DATA

#### 5-3. Description

A general description of the air conditioner, the location and description of the identification and instruction plates are contained in the Operator and Organizational Maintenance Manual. Direct and general support and depot repair and maintenance instructions are described in appropriate sections of this manual.

#### 5-4. Tabulated Data

a. *General.* This paragraph contains all the overhaul data pertinent to direct and general support and depot maintenance personnel. A wiring diagram of the air conditioner (fig. 1-4), a wiring conversion diagram (fig. 2-2), and a refrigerant flow diagram (fig. 1-6) are also included.

b. *Air Conditioner.*

Manufacturer ----- Keco Industries, Inc.  
Model ----- F-60

Cooling capacity ----- 60,000 Btuh (British thermal units hour) 60° to 125° (degrees) F. (Fahrenheit) ambient air temperature, unit maintains 70° to 76°F.  
Size ----- 5 ton  
Cycle ----- 50/60  
Phase ----- 3  
Wire ----- 4  
Voltage ----- 208 '416 v (volts)  
Type ----- Self-contained with remote control panel

#### c. Compressor.

Manufacturer ----- Carrier Air Conditioner Co.  
Model ----- 6D63-119-8  
Design ----- Semi-hermatically sealed  
Number of Cylinders ----- 6  
Bore ----- 2 in. (inches)  
Stroke ----- 1 1/4 in.  
Lubrication ----- Forced  
Service discharge valve ----- 7/8 in. od (outside diameter)  
Service suction valve ----- 1 1/8 in. od.  
Motor:  
Cycle ----- 50/60  
Phase ----- 3

Voltage ----- 208/416 v  
 Lead-in wires ----- 4  
 Speed ----- 1,750 rpm (revolutions per minute)  
 Full load amperage ----- 30/15 amp (amperes)  
 Rated horsepower ----- 6  
 Minimum operating voltage at motor terminals. 195 v  
 Refrigerant (R-12) ----- CCL<sub>2</sub>F<sub>2</sub>

*d. Evaporator Fan Motor.*

Manufacturer ----- Louis Allis Co.  
 Type ----- CJ1  
 Horsepower ----- 2  
 Cycle ----- 60/50  
 Phase ----- 3  
 Voltage ----- 208/416 v  
 Lead-in wires ----- 4  
 Code ----- K  
 Frame ----- 184  
 Rotation from shaft end. Counterclockwise  
 Full amperage load ----- 5.8/2.9 amp

*e. Capacity.*

Refrigerant (dichloro-difluoromethane (R-12) 30 lb (pounds)  
 Compressor oil ----- 5 qts (quarts)

*f. Physical Properties of Compressor Crankcase Oil.*

Viscosity at 100°F ----- SSU-150±10 Sec.  
 Dielectric minimum ----- 25 kv (kilovolts)  
 Flock point maximum ----- 70°F.  
 Pour point maximum ----- 35°F.  
 Neutralization No. Max. 0.05F.  
 imum.  
 Flash point minimum ----- 330°F.

*g. Torque Values of Compressor Bolts.*

1/4-20 ----- 6-10 ft-lb (foot-pounds)

|         |         |       |
|---------|---------|-------|
| 5/16-18 | 18-22   | ft-lb |
| 5/16-24 | 28-30   | ft-lb |
| 3/8-16  | 30-35   | ft-lb |
| 7/16-20 | 42-47   | ft-lb |
| 7/16-14 | 45-50   | ft-lb |
| 1/2-13  | 50-60   | ft-lb |
| 5/8-18  | 100-120 | ft-lb |

*h. Compressor Repair and Replacement Standards.* Table 5-1 lists manufacturers sizes, tolerances, and maximum allowable wear.

*Table 5-1. Compressor Repair and Placement Standards*

|                                    | Manufacturer's dimensions and tolerances in inches |        | Maximum allowable wear |
|------------------------------------|--|--------|------------------------|
|                                    | Min.   | Max.   |                        |
| <b>Shaft:</b>                      |  |        |                        |
| Main bearing diameter              | --   | 1.6260 | 0.0020                 |
| Main bearing journal diameter.     | 1.6233   | --     | 0.0020                 |
| Pump end bearing diameter.         | --   | 1.3755 | 0.0020                 |
| Pump end bearing journal diameter. | 1.3735   | --     | 0.0020                 |
| Crankpin diameter                  | 2.2030   | --     | 0.0025                 |
| Throw                              | 1.246  | 1.250  | --                     |
| Thrustwasher                       | --   | 0.157  | 0.0025                 |
| <b>Eccentric:</b>                  |  |        |                        |
| Eccentric diameter                 | --   | 2.2053 | 0.0020                 |
| Piston pin bearing                 | 0.6878   | --     | 0.0010                 |
| <b>Cylinders:</b>                  |  |        |                        |
| Bore                               | --   | 2.0005 | 0.0020                 |
| Piston diameter                    | 1.996  | --     | 0.0020                 |
| Piston pin diameter                | 0.6873   | --     | 0.0010                 |
| Piston pin bearing                 | push fit   |        |                        |
| Piston ring gap                    | 0.005  | 0.013  | 0.025                  |
| Piston ring side clearance         | 0.001  | 0.002  | 0.002                  |

### Section III. REPAIR PARTS, SPECIAL TOOLS, AND EQUIPMENT

#### 5-5. Special Tools and Equipment

No special tools or equipment are required by direct and general support and depot maintenance personnel for maintenance of the air conditioner.

#### 5-6. Direct Support, General Support, and Depot Maintenance Repair Parts

Direct and general support and depot maintenance repair parts are listed and illustrated in TM 5-4120-288-25P.

#### 5-7. Specially Designed (Fabricated) Tools and Equipment

The specially designed tools and equipment

illustrated in figure 6-27 and listed in table 5-2 are for direct support maintenance personnel performing maintenance on the air conditioner. The tools listed in table 5-2 are not available for issue but must be fabricated by qualified direct support maintenance personnel.

*Table 5-2. Specially Designed Tools.*

| Item           | Reference Fig. Para | Use                               |
|----------------|---------------------|-----------------------------------|
| Adjusting tool | 6-27-6-29           | To adjust electronic angle valve. |

## Section IV. TROUBLESHOOTING

### 5-8. General

This section provides information useful in diagnosing unsatisfactory operation or failure of the Model F-60 Air Conditioner or its components.

### 5-9. Troubleshooting Table

Malfunctions which may occur are listed in table 5-2. Each malfunction stated is followed by a list of probable causes of the trouble. The corrective action recommended is described opposite the probable cause.

Table 5-3. Troubleshooting.

| Malfunction                                | Probable cause  | Corrective action   |
|--|---|---|
| 1. COOLING INSUFFICIENT                    | <ul style="list-style-type: none"> <li>a. Temperature control switch set too high or defective.</li> <li>b. Improper refrigerant charge</li> <li>c. Thermostatic expansion valve defective.</li> <li>d. Refrigerant charge low</li> <li>e. Filter drier clogged</li> <li>f. Defective wiring harness</li> </ul> | <ul style="list-style-type: none"> <li>a. Adjust or replace the temperature control switch (para 6-24).</li> <li>b. Add refrigerant, or drain and refill the refrigerant (paras 6-2 thru 6-6).</li> <li>c. Replace a defective thermostatic expansion valve (paras 6-78 thru 6-80).</li> <li>d. Purge and charge the refrigerant system (paras 6-5 and 6-6).</li> <li>e. Replace filter drier (paras 6-49 thru 6-51).</li> <li>f. Repair or replace the defective wiring harness (paras 6-29 thru 6-31).</li> </ul> |
| 2. AIR CONDITIONER NOISY DURING OPERATION. | <ul style="list-style-type: none"> <li>a. Compressor oil level low</li> <li>b. Defective compressor or compressor motor.</li> </ul>   | <ul style="list-style-type: none"> <li>a. Inspect for leaks, add or change the oil.</li> <li>b. Rebuild the compressor (paras 6-41 thru 6-43).</li> </ul>   |
| 3. AIR CONDITIONER FAILS TO START.         | <ul style="list-style-type: none"> <li>a. Defective wiring harness, receptacle, or plugs.</li> <li>b. Defective components on remote control panel.</li> <li>c. Defective thermostatic temperature switch.</li> <li>d. Compressor motor starter defective.</li> <li>e. Compressor motor defective</li> </ul>    | <ul style="list-style-type: none"> <li>a. Replace unserviceable wiring harness, receptacles, and plugs (paras 6-29 thru 6-31).</li> <li>b. Replace defective components on the remote control panel (paras 6-12 thru 6-14).</li> <li>c. Replace defective temperature switch (paras 6-24 thru 6-26).</li> <li>d. Replace compressor motor starter (paras 6-16 thru 6-18).</li> <li>e. Rebuild compressor motor (paras 6-41 thru 6-43).</li> </ul>   |
| 4. AIR CONDITIONER COOLING EXCESSIVE.      | <ul style="list-style-type: none"> <li>a. Setpoint adjuster defective</li> <li>b. Temperature transmitter defective.</li> <li>c. Electronic angle valve defective.</li> </ul>   | <ul style="list-style-type: none"> <li>a. Position set-point adjuster at proper setting or replace when defective (paras 6-12 thru 6-14).</li> <li>b. Replace defective temperature transmitter (paras 6-65 thru 6-67).</li> <li>c. Replace defective electronic angle valve (paras 6-69 thru 6-72).</li> </ul>   |
| 5. AIR CONDITIONER STOPS                   | <ul style="list-style-type: none"> <li>a. Defective compressor motor</li> <li>b. Components defective in the compressor and condenser motor control box.</li> <li>c. Damaged wiring harness</li> </ul>  | <ul style="list-style-type: none"> <li>a. Rebuild compressor motor (paras 6-41 thru 6-43).</li> <li>b. Replace defective components in the compressor and condenser motor control box (paras 6-16 thru 6-18).</li> <li>c. Repair damaged wiring harness (paras 6-29 thru 6-31).</li> </ul>  |

Table 5-3—Continued

| Malfunction   | Probable cause  | Corrective action   |
|---|---|---|
| 6. COMPRESSOR AUTOMATICALLY TRIPS AT PRESSURE SWITCH. | <p>d. Fuse blown -----</p> <p>a. Pressure switch defective -----</p> <p>b. Defective tubing to the pressure switch.</p> <p>c. Defective wiring on the pressure switch.</p> <p>d. Operating pressures above or below pressure switch settings.</p> | <p>d. Check circuits for overload and replace fuse.</p> <p>a. Replace defective dual pressure switch (paras 6-24 thru 6-27).</p> <p>b. Replace tubing to the pressure switch (paras 6-24 thru 6-27).</p> <p>c. Replace defective wiring on pressure switch (paras 6-24 thru 6-27).</p> <p>d. Check pressures.</p>                 |
| 7. COMPRESSOR INOPERATIVE.                            | <p>a. Defective wiring harness or leads on the compressor.</p> <p>b. Defective compressor motor -----</p>   | <p>a. Repair or replace defective harness or leads on compressor (paras 6-29 thru 6-31).</p> <p>b. Rebuild compressor motor (paras 6-41 thru 6-43).</p>   |
| 8. COMPRESSOR CYCLES INTERMITTENTLY.                  | <p>a. Defective components in the compressor and condenser motor control box.</p> <p>b. Defective wiring harness -----</p> <p>c. Defective switch in the control box.</p> <p>d. Refrigerant level low -----</p>                                   | <p>a. Replace defective components in compressor and condenser motor control box (paras 6-16 thru 6-18).</p> <p>b. Repair or replace defective wiring harness (paras 6-29 thru 6-31).</p> <p>c. Replace defective switch and set at proper adjustment (paras 6-24 thru 6-27).</p> <p>d. Charge refrigerant system (para 6-6).</p> |

## Section V. REMOVAL AND INSTALLATION OF MAJOR COMPONENTS

### 5-10. General

The air conditioner contains three major components that can be removed as assemblies for more efficient maintenance. The compressor, evaporator coil, and condenser coil can be removed from frame assembly when major repair or maintenance is required. Remove only those parts that are necessary for removal of the component requiring maintenance.

### 5-11. Compressor Assembly

#### a. Removal.

- (1) Position the controls and pump down refrigerant to the liquid receiver assembly (para 6-6) and open circuit breaker.
- (2) Remove lower front and both lower side panels from the frame assembly (fig. 3-9).
- (3) Open the charging and purging valve and bleed out all pressure (para 6-4).
- (4) Remove suction service valve (para

6-38) and discharge service valve (para 6-37).

- (5) Remove compressor assembly as instructed on figure 5-1.

#### b. Installation.

- (1) Install compressor assembly in air conditioner in reverse of instructions on figure 5-1.
- (2) Install suction service valve (para 6-35) and the discharge service valve (para 6-39).
- (3) Purge and charge the refrigeration system (paras 6-4 and 6-6).
- (4) Install the front and side panels (fig. 3-9).

*Caution:* If compressor and motor assembly is being replaced due to motor burnout, the procedure in (5) through (12) below must be adhered to.

- (5) Flush entire system with dry nitro-

gen or dry R-12 refrigerant under pressure.

- (6) Replace refrigerant filter drier (para 6-49 thru 6-51).
- (7) Charge and discharge refrigeration system three times.
- (8) Inspect motor compressor assembly for correct oil level and fill as necessary.
- (9) Charge system through a filter drier

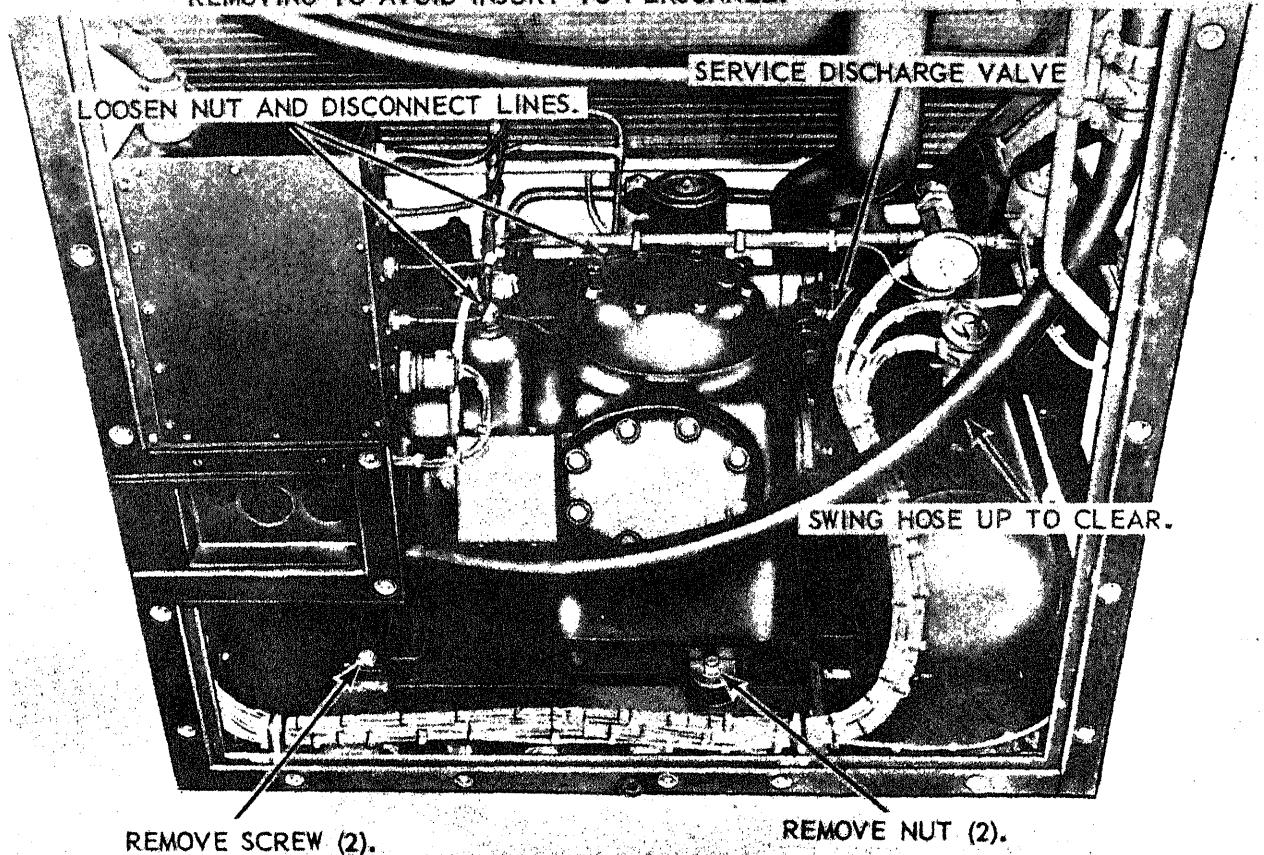
located between the refrigerant drum and charging manifold.

- (10) Start air conditioner and operate for 48 hours.
- (11) Inspect condition of oil in compressor assembly. If it is discolored, change oil; replace filter drier (paras 6-49 thru 6-51). Replace moisture indicator (paras 6-53 thru 6-55), and

**CAUTION: WHEN NECESSARY TO REMOVE SOLDERED LINES, EXERCISE EXTREME CARE. DO NOT APPLY HEAT OVER MORE AREA THAN NECESSARY. INSULATE AROUND HEATED AREA WHEN POSSIBLE.**

**NOTE: LOOSEN NUT AND DISCONNECT ELECTRICAL LEADS FROM THE COMPRESSOR.**

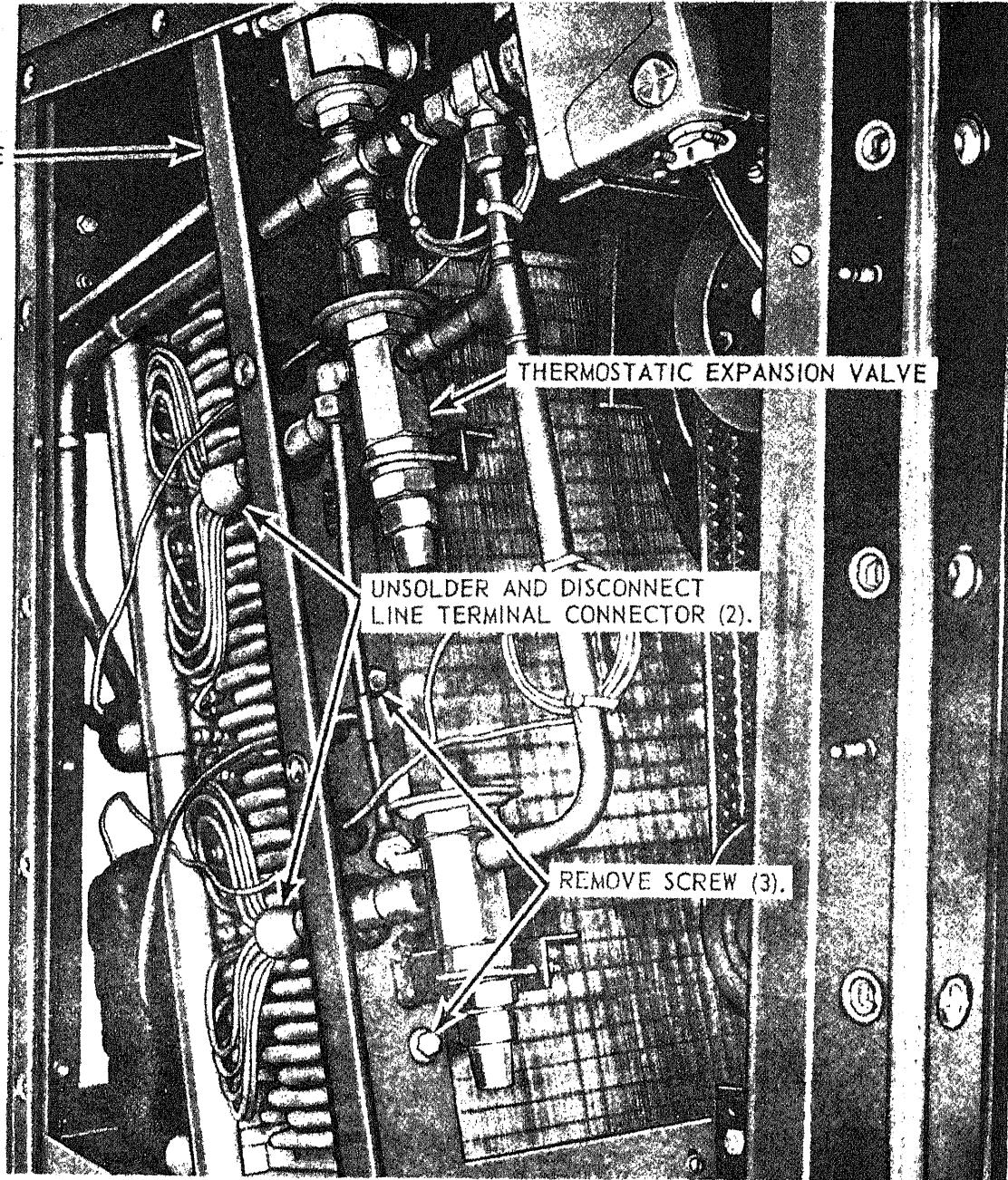
**WARNING: THE COMPRESSOR WEIGHS 300 POUNDS. USE SUFFICIENT MANPOWER WHEN REMOVING TO AVOID INJURY TO PERSONNEL.**



EMC 4120-216-35/4

Figure 5-1. Compressor assembly, removal and installation.

NOTE: REMOVE THE MOUNTING HARDWARE ON THE OTHER END OF THE EVAPORATOR COIL IN A SIMILAR MANNER.

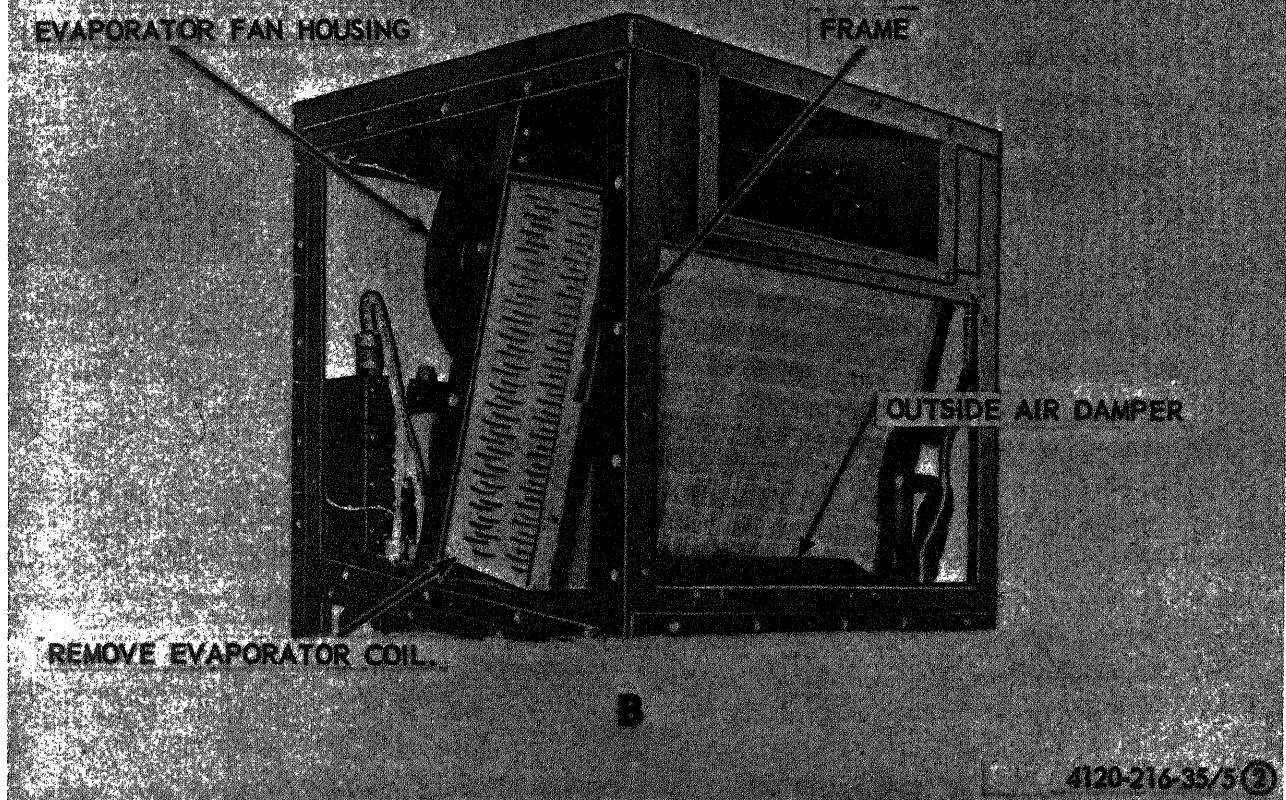


CAUTION: WHEN NECESSARY TO REMOVE SOLDERED LINES, EXERCISE EXTREME CARE. DO NOT APPLY HEAT OVER MORE AREA THAN IS NECESSARY. INSULATE AROUND HEATED AREAS WHERE POSSIBLE.

A

4120-216-35/5 1

NOTE: TO REMOVE EVAPORATOR COIL, PULL IT OUT THE SIDE OF THE AIR CONDITIONER.



4120-216-35/5 ②

*B. Coil, removal.*

*Figure 5-2 ②. Lines and hardware removal, evaporator coil, removal and installation.*

make sure system is completely dry. Operate air conditioner.

(12) Inspect oil after 14 days. If oil is discolored, replace and recheck after 14 more days. Continue this procedure until the oil remains clear for at least 30 days.

### 5-12. Evaporator Coil

#### *a. Removal.*

- (1) Remove the upper side panels and the evaporator filter panel assembly (fig. 3-9).
- (2) Pump down refrigerant (para 6-3).
- (3) Open purging and charging valve and bleed out all pressure (para 6-4).

(4) Remove evaporator coil as instructed on figure 5-2.

#### *b. Installation.*

- (1) Install evaporator coil in reverse of instructions on figure 5-2.
- (2) Install upper side panels and evaporator filter panel assembly (fig. 3-9).
- (3) Purge and charge the air conditioner (paras 6-5 and 6-6).

### 5-13. Condenser Coil

#### *a. Removal.*

- (1) Remove lower side and front panels (fig. 3-9).

- (2) Discharge refrigerant from the refrigeration system (para 6-4).
- (3) Remove condenser fans (fig. 3-14).
- (4) Remove compressor suction service valve (para 6-33).
- (5) Remove compressor discharge valve (para 6-37).
- (6) Remove compressor (para 5-11).
- (7) Remove charging and purging valve (para 6-45).
- (8) Remove filter drier (para 6-49).
- (9) Remove the moisture indicator (para 6-53).
- (10) Remove quenching line solenoid valve (para 6-57).
- (11) Remove quenching thermostatic expansion valve (para 6-61).
- (12) Remove hot gas bypass solenoid valve (para 6-81).
- (13) Remove hot gas bypass valves (para 6-86).
- (14) Remove receiver angle shutoff valve (para 6-94).
- (15) Remove receiver shut diaphragm stop valve (para 6-98).
- (16) Remove receiver (para 6-102).
- (17) Remove condenser coil as instructed on figure 5-3.

*b. Installation.*

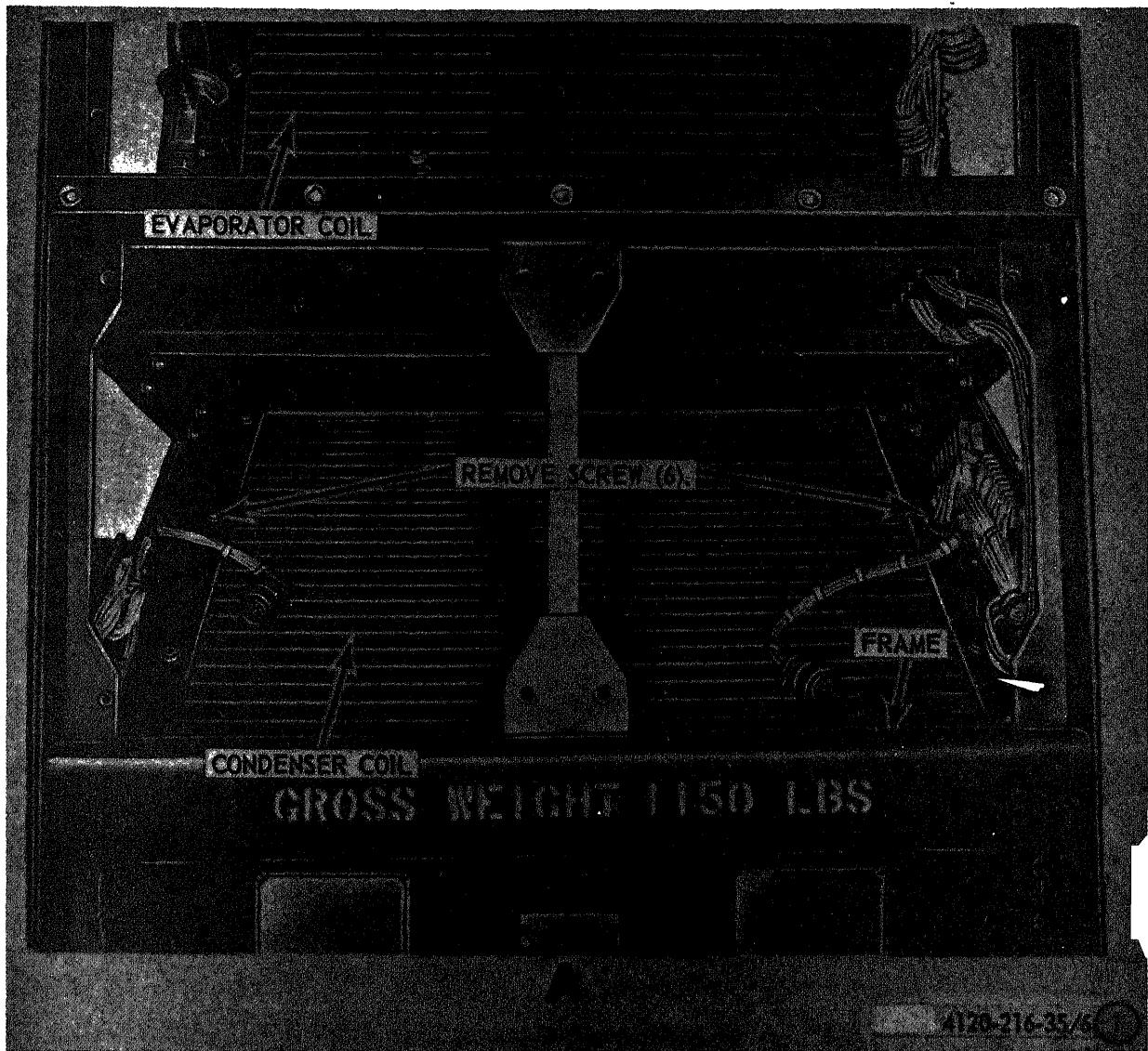
- (1) Install condenser coil in reverse of instructions on figure 5-3.
- (2) Install receiver (para 6-104).
- (3) Install receiver shutoff diaphragm stop valve (para 6-101).
- (4) Install receiver angle shutoff valve (para 6-96).
- (5) Install hot gas bypass valves (para 6-89).
- (6) Install hot gas bypass solenoid valve (para 6-84).
- (7) Install quenching thermostatic expansion valve (para 6-63).
- (8) Install quenching line solenoid valve (para 6-59).

- (9) Install moisture indicator (para 6-55).
- (10) Install filter drier (para 6-51).
- (11) Install charging and purging valve (para 6-47).
- (12) Install compressor (para 5-11).
- (13) Install compressor discharge valve (para 6-39).
- (14) Install compressor suction service valve (para 6-35).
- (15) Install condenser fans (fig. 3-14).
- (16) Purge and charge air conditioner (paras 6-5 and 6-6).
- (17) Install lower side and front panels (fig. 3-9).

#### **5-14. Frame Assembly**

*a. Removal.*

- (1) Remove all panels, screen, and grille (figs. 3-9, 3-10 and 3-13).
- (2) Remove evaporator motor and blower condenser fan motors (figs. 3-15 and 3-19).
- (3) Remove evaporator coil (para 5-12).
- (4) Remove thermostatic expansion valves (para 6-78).
- (5) Remove electronic angle valve (para 6-70).
- (6) Remove solenoid valve (para 6-74).
- (7) Remove temperature transmitter (para 6-65).
- (8) Remove hot gas bypass solenoid valve (para 6-82).
- (9) Remove evaporator fan motor control box (para 6-20).
- (10) Remove temperature pressure control box assembly (para 6-25).
- (11) Remove electrical plugs, receptacles, clamps, terminal boards, and wiring harness (para 6-29).
- (12) Remove compressor and condenser fan motors control box (para 6-16).
- (13) Remove condenser coil assembly (para 6-106).
- (14) Remove compressor (para 6-41).



*A. Mounting, removal.*

*Figure 5-3 ①. Condenser coil, removal and installation.*

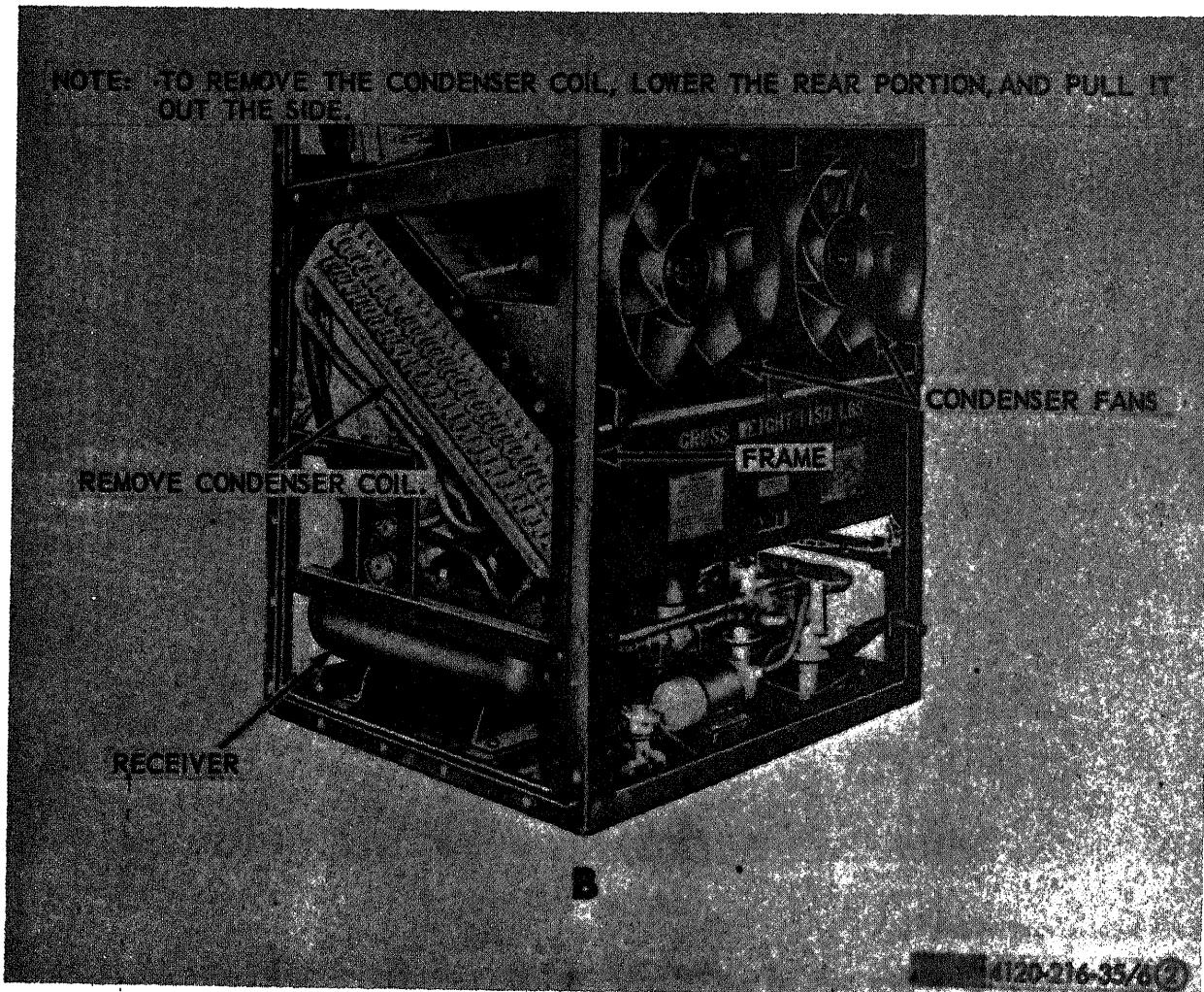
- (15) Remove receiver assembly (para 6-102).
- (16) Remove frame from the mounting base (fig. 1-3).

*b. Installation.*

- (1) Install air conditioner frame on mounting base (figs. 1-3 and 2-1).
- (2) Install receiver assembly (para 6-104).
- (3) Install compressor (para 5-11).
- (4) Install condenser coil assembly (para 6-108).

- (5) Install compressor and condenser fan motors control box (para 6-18).
- (6) Install electrical plugs, receptacles, clamps, terminal boards, and wiring harness (para 6-30).
- (7) Install temperature pressure control box assembly (para 6-27).
- (8) Install evaporator fan motor control box (para 6-22).
- (9) Install hot gas bypass solenoid valve (para 6-84).

- (10) Install temperature transmitter (para 6-67).
- (11) Install solenoid valve (para 6-76).
- (12) Install electronic angle valve (para 6-72).
- (13) Install thermostatic expansion valves (para 6-80).
- (14) Install evaporator coil (para 5-12).
- (15) Install evaporator motor and blower condenser fan motors (figs. 3-19 and 3-15).
- (16) Install all panels, screen, and grille (figs. 3-9, 3-10 and 3-13).



*B. Coil removal.*

*Figure 5-3 ②.—Continued.*

## CHAPTER 6

### REPAIR INSTRUCTIONS

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#### Section I. REFRIGERATION SYSTEM

##### 6-1. General

The refrigeration system is a series of components through which refrigerant in liquid or gas form is pumped to provide the heat carrying medium. The refrigeration system consists of a compressor where the gas is compressed from low pressure to a high pressure and pumped into the condenser coil. The condenser converts the gas into a high pressure liquid. This high pressure liquid flows through the liquid receiver filter drier, moisture indicator, solenoid valve, and electronic angle valve. From this point on, the gas is divided into two parallel circuits and is passed through an expansion valve in each circuit. The refrigerant then expands into the evaporator coil, cooling rapidly as it loses pressure. This rapid expansion vaporizes the liquid refrigerant, and at the same time absorbs heat from air passing over the evaporator coil. The gas is then returned to compressor as a warm low pressure gas. A hot gas bypass circuit provides automatic unloading of the compressor as follows: when load is reduced, pressure in the suction line is reduced, and when pressure reaches a predetermined point the hot gas bypass pressure valves open to recirculate the hot gas from the compressor discharge to the compressor suction. To prevent the hot gas from overheating the compressor a quenching expansion valve admits refrigerant from the liquid line to the compressor suction line.

##### 6-2. Testing the Refrigeration System for Leaks

a. *Halide Torch Leak Detector.* Use a halide leak detector to test tubing for leaks. The halide leak detector is an alcohol torch with

an aspirating tube which permits air from the vicinity of a possible leak source to be drawn into the flame. The torch flame is normally blue and if there is refrigerant gas in the air the flame will turn a blue-green in color.

##### b. *Other Methods of Testing.*

- (1) Listen for a hissing at all valves.
- (2) Check for a warm suction line after air conditioner has been operating 10 minutes.
- (3) Check for a cool receiver after 10 minutes of operation.
- (4) Check for oil or froth on joints, tubing, coils, and gaskets.

##### 6-3. Pumping Down Refrigerant

a. *General.* Pumpdown is the operation by which the refrigerant in a charged system is pumped into and maintained within the receiver. Pumpdown is performed before seasonal shutdown or before replacing any components.

##### b. *Pumping Down.*

- (1) Place selector switch in the OFF position (fig. 2-2A).
- (2) Remove the lower front and right side panels (fig. 3-9).
- (3) Remove valve cap on compressor suction service valve (para. 6-32) and discharge service valve (para. 6-36) and back seat both valves.
- (4) Remove suction valve port plug and install a suitable compound pressure and vacuum gage.
- (5) Open suction valve three turns so the gage will register.
- (6) Bridge the electrical circuit of low

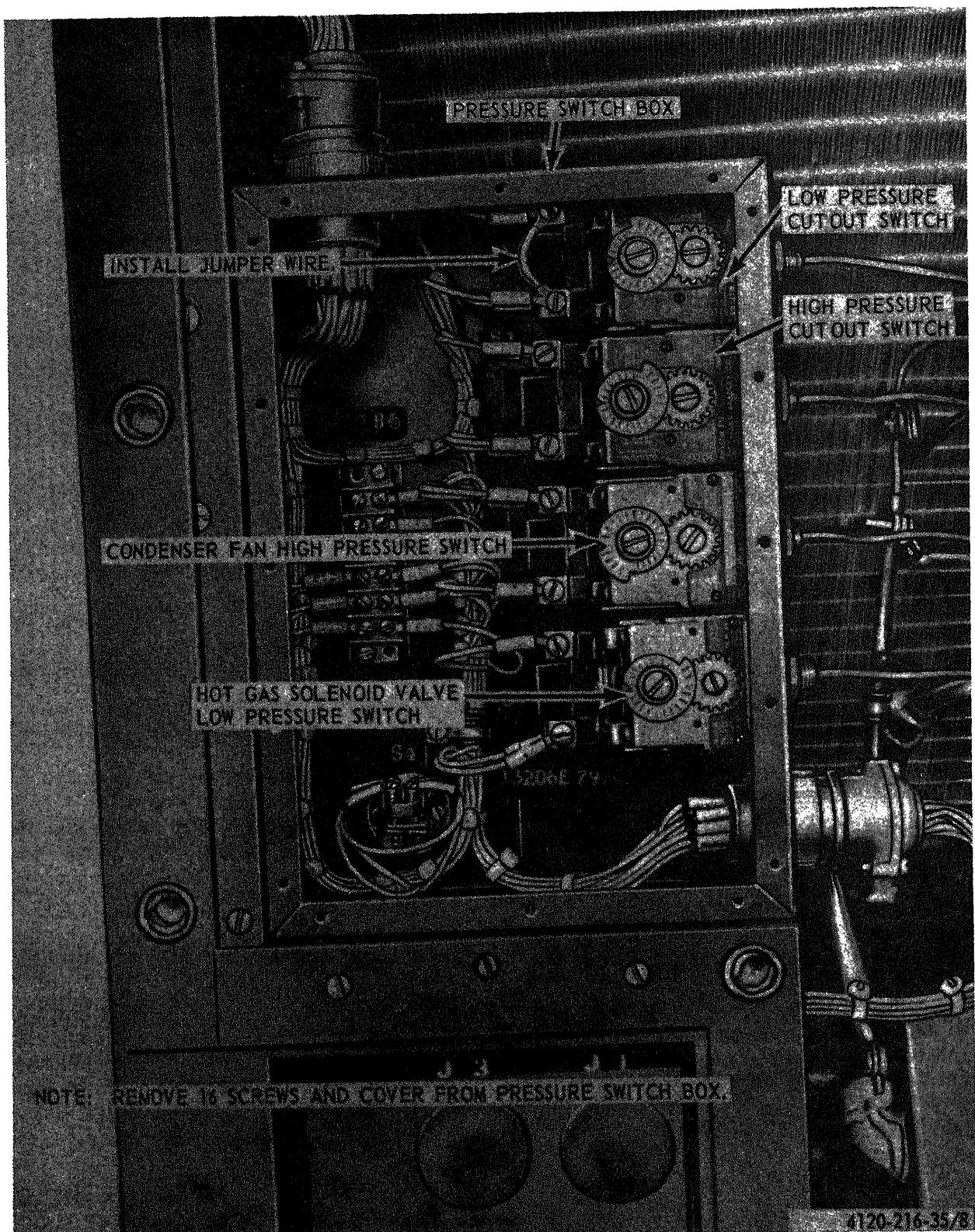


Figure 6-1 Bridging electrical circuit.

pressure switch as instructed on figure 6-1.

- (7) Close liquid receiver shutoff valve to prevent gas from flowing into the liquid line.
- (8) Operate air conditioner until the pressure registers three psi pressure; stop air conditioner.
- (9) Allow air conditioner to stand idle for 15 to 20 minutes as pressure will again build up. Repeat procedure until gage pressure will again build up. Repeat procedure until gage holds at three psi pressure.
- (10) Back-seat the compressor suction

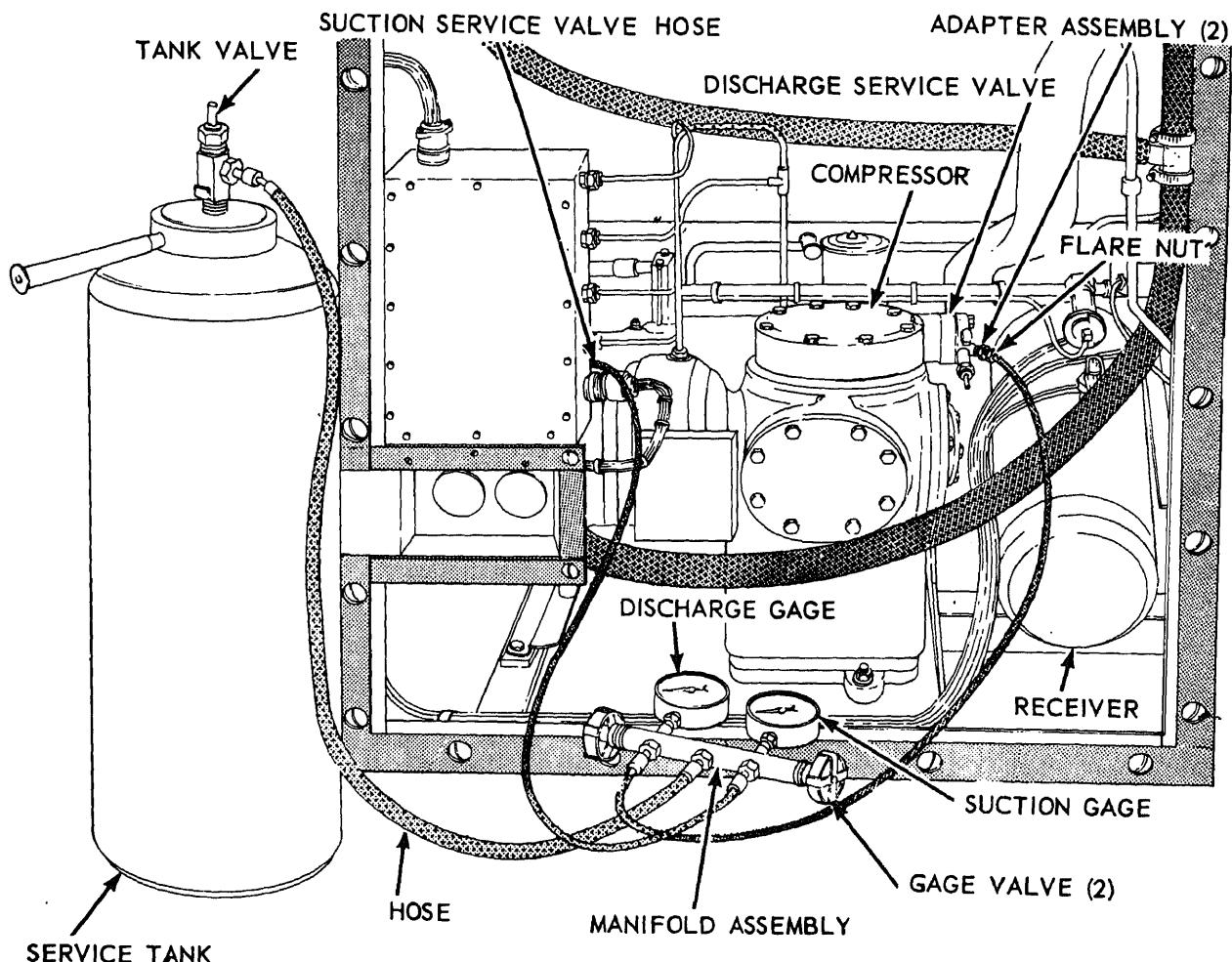
valve and remove gage and install plug.

- (11) Close receiver inlet valve.
- (12) Return the compressor suction and discharge valves to normal.
- (13) Remove the jumper wire illustrated on figure 6-1.
- (14) Install panels (fig. 3-9).

#### 6-4. Discharging the Refrigerant from the Refrigeration System

##### a. Discharging Into a Service Tank.

- (1) Back-seat the suction and discharge valves in the compressor.
- (2) Remove suction and discharge service



port plugs and install adapters, hoses, manifold assembly, and service tank as instructed on figure 6-2.

- (3) Open gage valves, loosen flare nut on the service tank, and crack the suction and discharge service valves from the backseat position. Allow any trapped air in the hose to escape into the atmosphere, and tighten flare nuts.
- (4) Open service tank valve, and back-seat suction valve, front-seat the discharge valve, and close the gage valve on the vacuum gage.
- (5) Operate air conditioner and allow the system to reach three psi. Close valve on the discharge gage. Allow air conditioner to stand idle for 10 to 15 minutes and repeat discharging

instructions until gage remains at three psi.

- (6) Close service tank valve, remove manifold hoses and adapters from the suction and discharge valves and install service valve plugs.

*b. Discharging Into Atmosphere.*

- (1) Remove the cap from the charging and purging valve and attach a suitable drain hose and allow refrigerant to escape into a suitable container as illustrated on figure 6-3.
- (2) After all gas has escaped remove hose, close valve, and replace cap.

## 6-5. Purging the Refrigeration System

*a. Purging After Pump Down.*

- (1) Front-seat the compressor discharge

**CAUTION: DO NOT INHALE REFRIGERANT GAS OR ALLOW IT TO CONTACT THE EYES. IMMEDIATELY GET TO FRESH AIR AND INHALE. WASH THE EYES WITH FRESH WATER.**

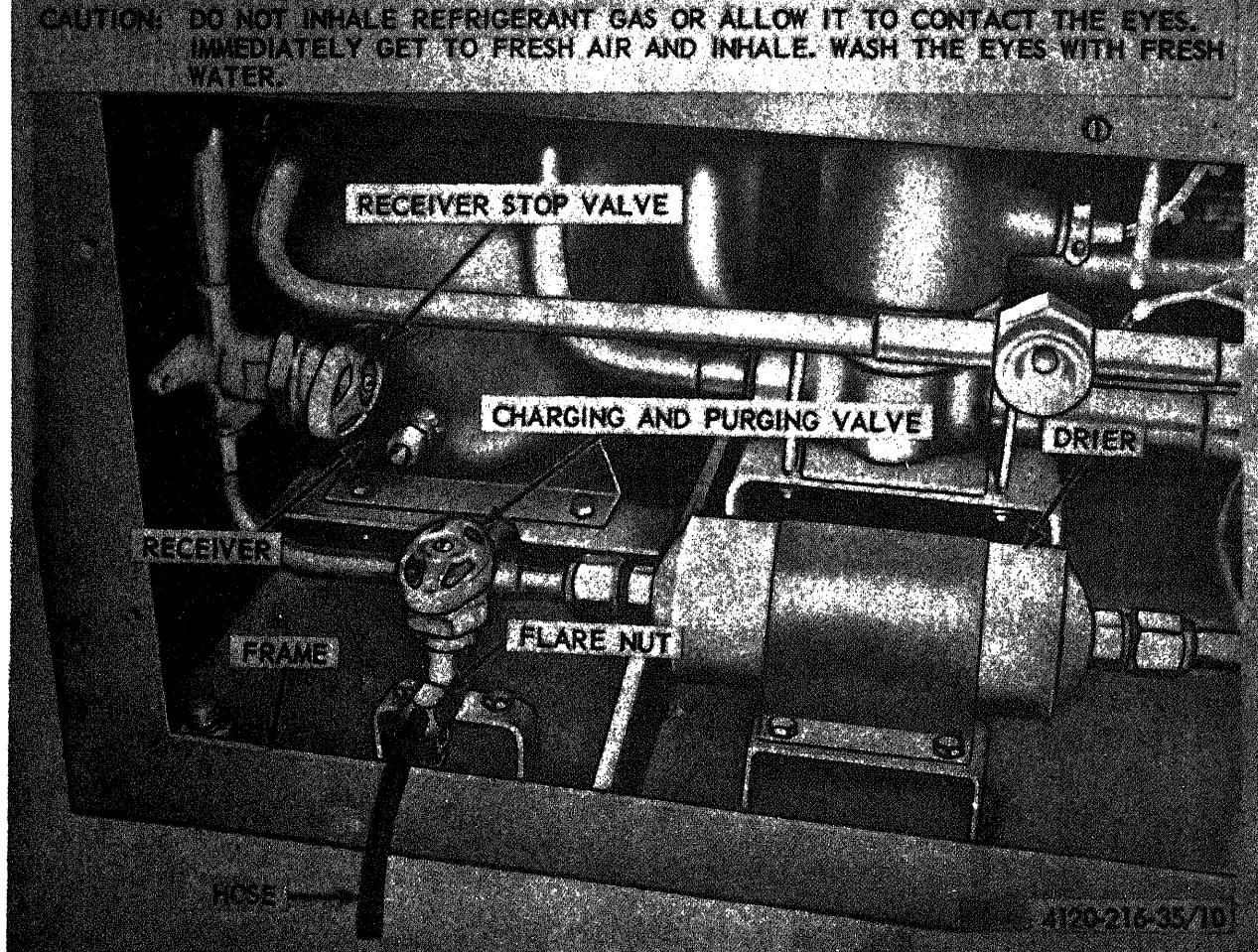


Figure 6-3. Discharging into atmosphere.

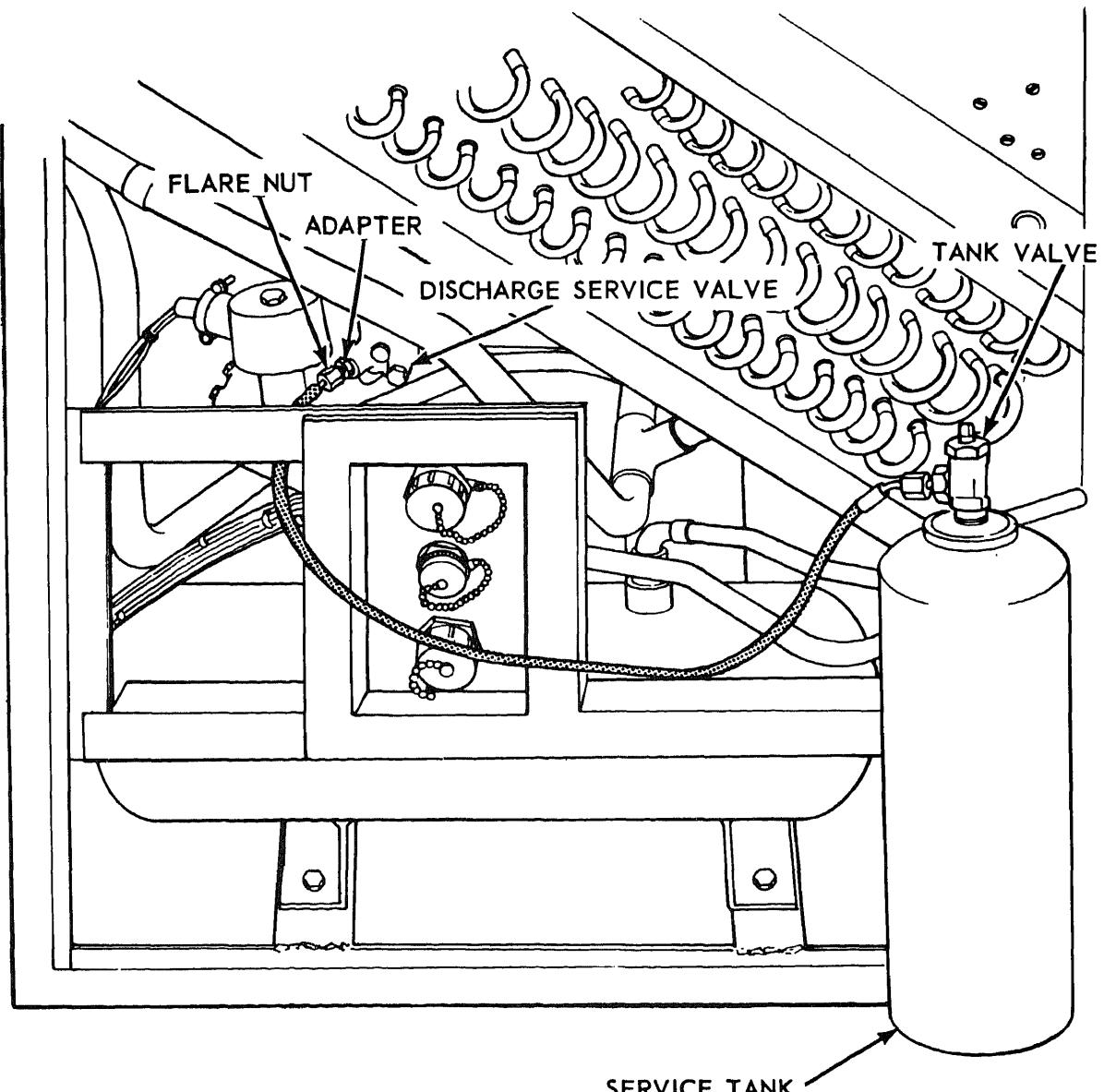
valve and back-seat the compressor suction valve.

- (2) Slowly back-seat the receiver discharge valve allowing refrigerant to enter system.
- (3) Loosen compressor discharge valve port plug and allow refrigerant to escape for 30 to 60 seconds or until system has purged.
- (4) Tighten valve port plug and back-seat the compressor discharge valve.

- (5) Operate air conditioner and add refrigerant as necessary (para 6-6).

b. *Purging After Discharging the System.*

- (1) Back-seat the compressor suction valve.
- (2) Crack the compressor suction valve three turns from the back-seat position.
- (3) Install the adapter, hose, and service tank as instructed on figure 6-4.
- (4) Loosen flare nut on compressor dis-



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Figure 6-4. Purging after discharging.

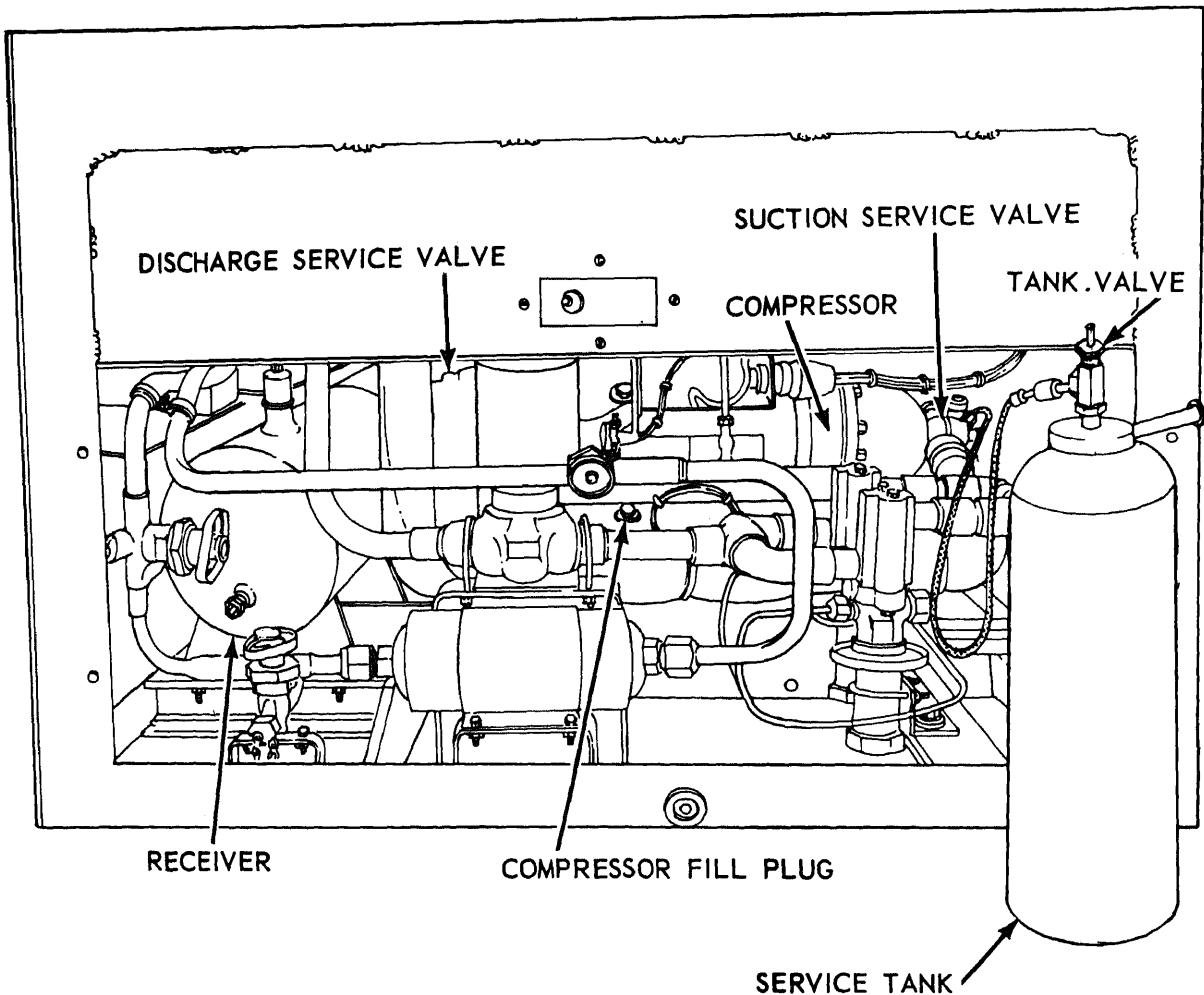
charge valve, open tank valve and purge air from hose. Tighten flare nut.

- (5) Crack the compressor suction valve three turns from the back-seat position and loosen valve port plug. Allow system to purge for 30 to 60 seconds and install valve port plug.
- (6) Remove oil temperature thermostat from compressor and allow compressor to purge for 30 to 60 seconds and install oil temperature thermostat.
- (7) Charge the refrigeration system (para 6-6).

## 6-6. Charging the Refrigeration System

### *a. Charging a Partially Full System.*

- (1) Back-seat the compressor suction valve and remove valve port plug.
- (2) Connect adapters, hoses, and service tank to the compressor suction valve as illustrated on figure 6-5, but do not tighten flare nut at suction valve.
- (3) Open the tank and gage valve about two turns, purge air from hose and tighten flare nut on compressor suction valve.



- (4) Operate air conditioner and crack suction valve from the back-seat position, allowing refrigerant to enter system.
- (5) Inspect for full charge (fig. 2-4c).
- (6) Close tank valve, operate air conditioner for 30 minutes and again check for full charge.
- (7) If system is full, back-seat the suction valve and remove hoses, service tank, and adapters. Install valve port plug. If system is not full, continue charging.

*b. Charging a Fully Discharged System.*

- (1) Purge entire refrigeration system (para 6-5).
- (2) Set service tank on scales and weigh the tank and charge.
- (3) Install adapter, hose, and service tank as instructed in *a* above.
- (4) Open tank valve, open both of the receiver valves and allow pressure to equalize.
- (5) Charge the refrigeration system as in *a* above until the 30 pounds of charge has been added.
- (6) Inspect for full charge (fig. 2-4c).

## Section II. EVAPORATOR FAN MOTOR

### 6-7. General

The evaporator fan motor is designed to operate on 208 volts or 416 volt electrical power. The evaporator fan draws air through the evaporator coil, where the air has been cooled, and forces it out through the conditioned air outlet ducts. The motor has sealed bearings that need no lubrication. The motor controls are located in the motor control box on frame at rear of the air conditioner.

### 6-8. Evaporator Fan Motor Removal and Disassembly

*a. Removal.* Remove evaporator fan motor and motor base from frame assembly (fig. 3-19).

*b. Disassembly.* Disassemble evaporator fan motor in numerical sequence as illustrated on figure 6-6.

### 6-9. Evaporator Fan Motor Cleaning, Inspection, Repair and Test

*a. Cleaning.* Clean all parts with a cloth

dampened with an approved solvent and dry thoroughly.

*b. Inspection.* Inspect all parts for nicks, wear, dents, and other unserviceable condition.

*c. Repair.* Replace or repair all defective parts.

*d. Test.* Use a multimeter, set on the ohms scale, and test each lead to ground. There should be no continuity. Test between each lead in turn. There should be continuity.

### 6-10. Evaporator Fan Motor Reassembly and Installation

*a. Reassembly.* Reassemble the evaporator fan motor in the reverse of the numerical sequence as illustrated on figure 6-6.

*b. Installation.* Install the motor base and evaporator fan motor on the frame assembly (fig. 3-19).

## Section III. REMOTE CONTROL PANEL ASSEMBLY

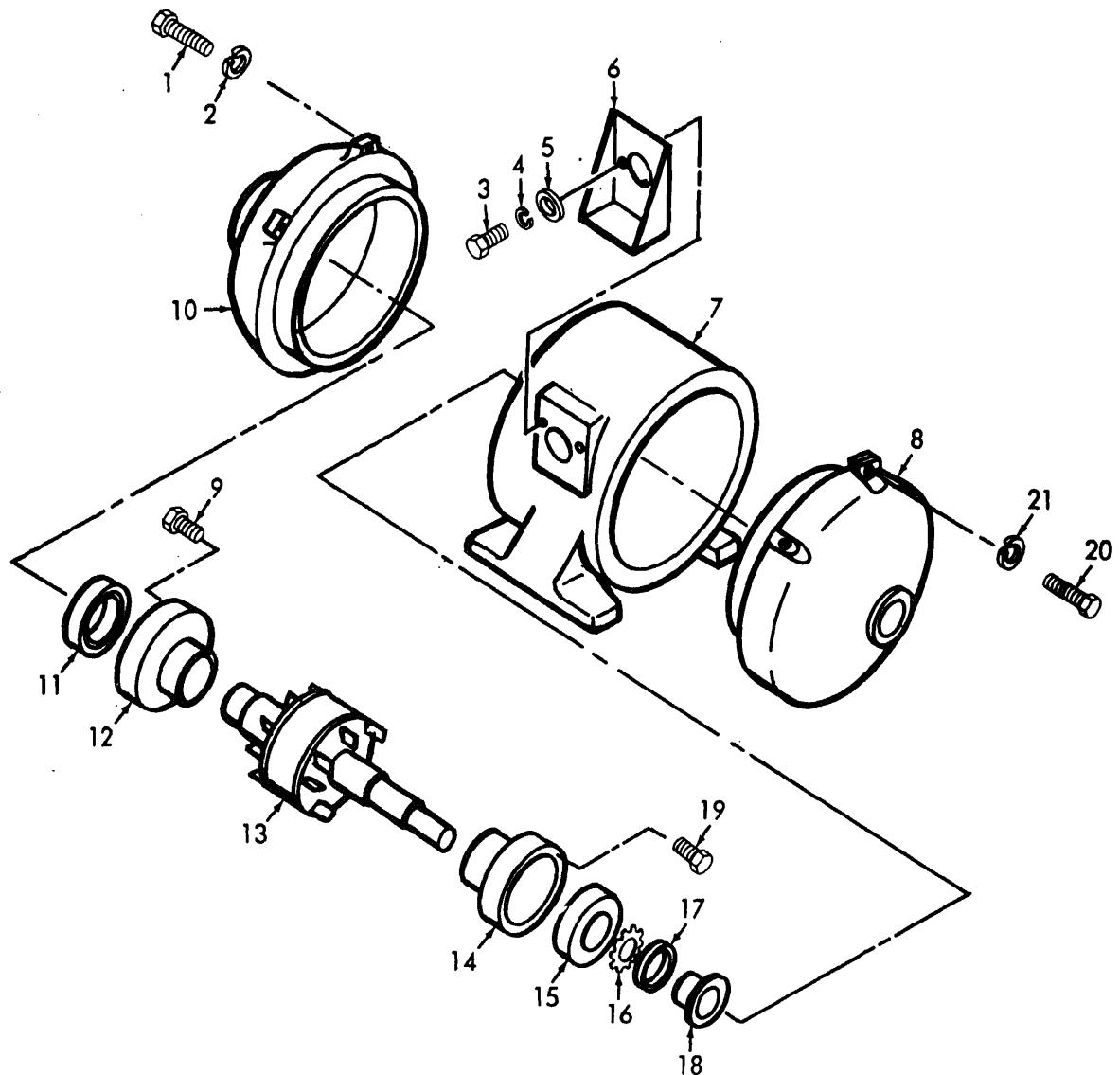
### 6-11. General

The remote control panel assembly located in the area receiving the conditioned air consists of a selector switch, indicator lights, circuit breaker, and setpoint adjuster that controls air conditioner operation. The remote control panel is electrically connected to air conditioner by the remote control cable and the power supply cable. All electrical power to air conditioner must pass through the circuit breaker first.

### 6-12. Remote Control Panel Assembly Removal and Disassembly

*a. Removal.*

- (1) Stop air conditioner.
- (2) Remove power supply and remote control cables from air conditioner and remote control panel. See wiring diagram (fig. 1-4).
- (3) Tag and disconnect all electrical leads to terminal boards and receptacles.



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|                              |                      |                       |
|------------------------------|----------------------|-----------------------|
| 1 Screw, special (4)         | 8 End cover          | 15 Bearing            |
| 2 Washer, lock (4)           | 9 Screw (3)          | 16 Washer, lock (1)   |
| 3 Screw (2)                  | 10 Front cover       | 17 Lock nut (1)       |
| 4 Washer, lock (2)           | 11 Bearing           | 18 Seal               |
| 5 Washer, flat (2)           | 12 Bearing cartridge | 19 Screw (3)          |
| 6 Junction box               | 13 Rotor             | 20 Screw, special (4) |
| 7 Housing and field assembly | 14 Bearing cartridge | 21 Washer, lock (4)   |

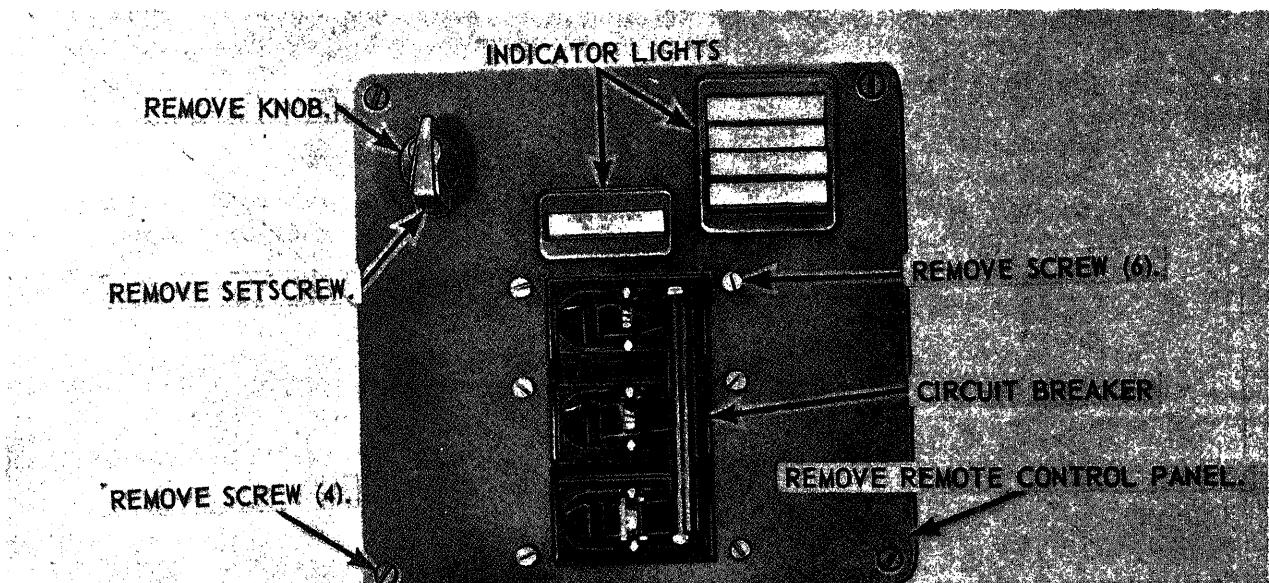
Figure 6-6. Evaporator fan motor, disassembly and reassembly, exploded view.

(4) Remove remote control panel and components from van as illustrated on figure 6-7.

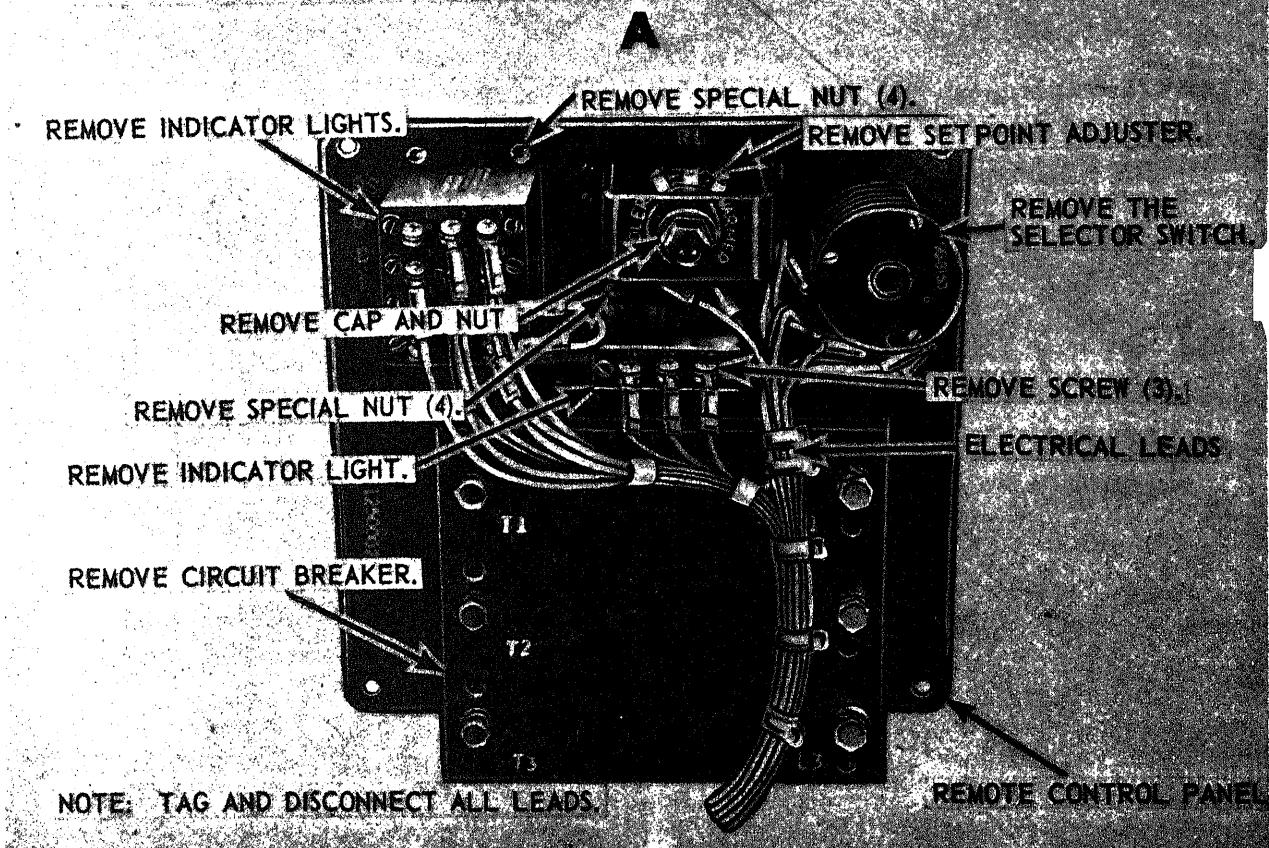
b. *Disassembly.* Disassemble remote control panel and components in numerical sequence as illustrated on figure 6-8.

#### 6-13. Remote Control Panel Assembly Cleaning, Inspection, Repair and Testing

a. *Cleaning.* Clean all parts with a cloth dampened with an approved solvent and dry thoroughly.



NOTE: AFTER REMOVING KNOB REMOVE NUT SECURING THE SELECTOR SWITCH TO THE REMOTE CONTROL PANEL.



A. Front.  
B. Rear.  
Figure 6-7. Remote control panel and components, removal and installation.

*b. Inspection.* Inspect all components for cracks, breaks, wear and other damage.

*c. Repair.* Replace all unserviceable parts.

*d. Testing.*

(1) Use a multimeter, set on ohms scale, and test selector switch for continuity and shorts.

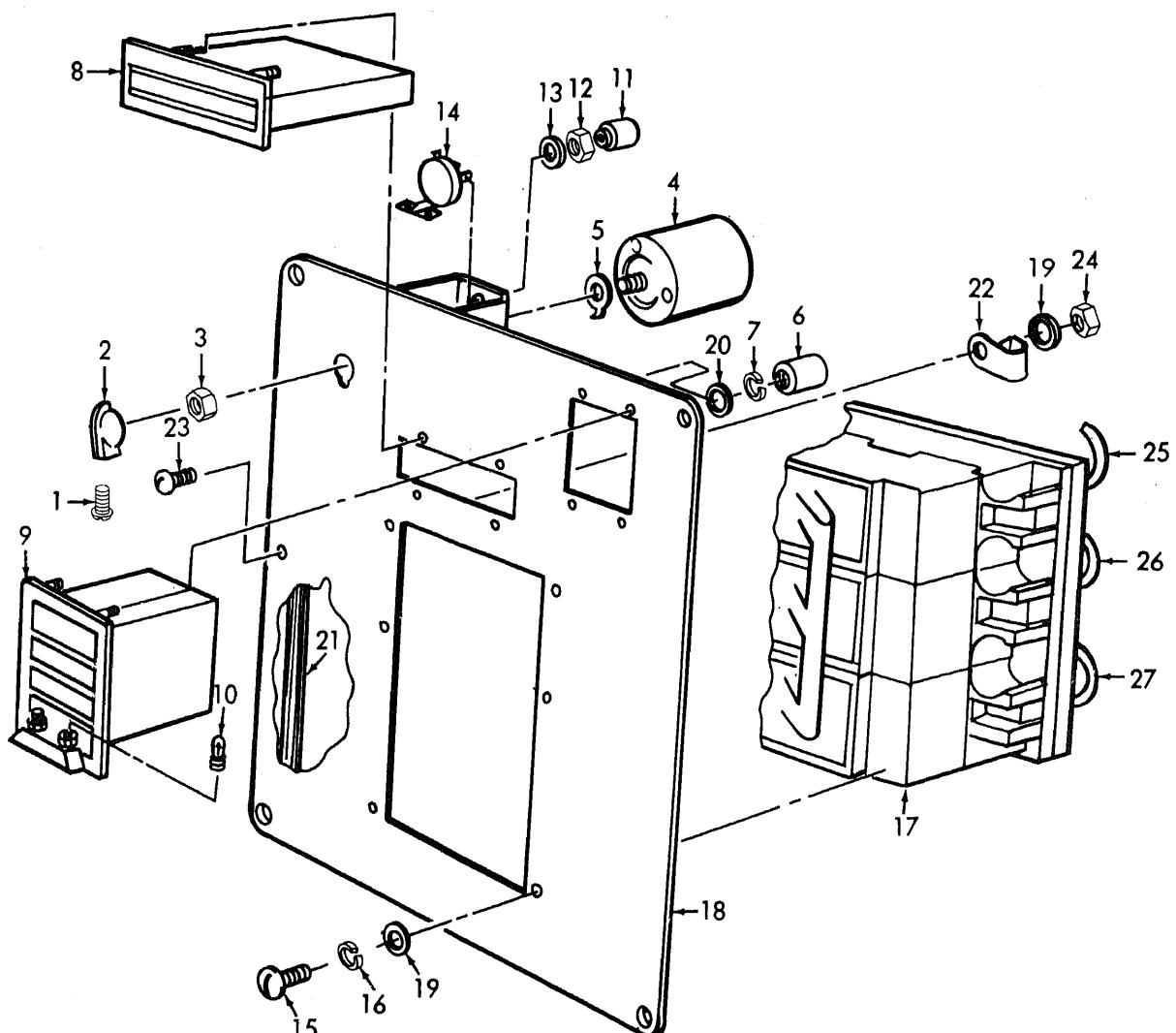
(2) Use a multimeter set on ohms scale and test the setpoint adjuster for

shorts and continuity from low to high readings on the meter.

(3) Use a multimeter set on ohms scale and test circuit breaker for shorts and continuity.

#### 6-14. Remote Control Panel Assembly, Reassembly and Installation

*a. Reassembly.* Reassemble the components



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|   |                  |    |                   |    |                      |    |                  |
|---|------------------|----|-------------------|----|----------------------|----|------------------|
| 1 | Setscrew         | 8  | Indicator light   | 15 | Screw (6)            | 22 | Clamp, loop      |
| 2 | Knob             | 9  | Indicator light   | 16 | Washer, lock (6)     | 23 | Screw, machine   |
| 3 | Nut              | 10 | Lamp (8)          | 17 | Circuit breaker      | 24 | Nut, selflocking |
| 4 | Selector switch  | 11 | Cap               | 18 | Remote control panel | 25 | Jumper           |
| 5 | Bracket          | 12 | Nut               | 19 | Washer (6)           | 26 | Jumper           |
| 6 | Nut, special (8) | 13 | Washer, lock IT   | 20 | Washer (4)           | 27 | Jumper           |
| 7 | Washer, lock (8) | 14 | Setpoint adjuster | 21 | Wiring harness       |    |                  |

Figure 6-8. Remote control panel and components, exploded view.

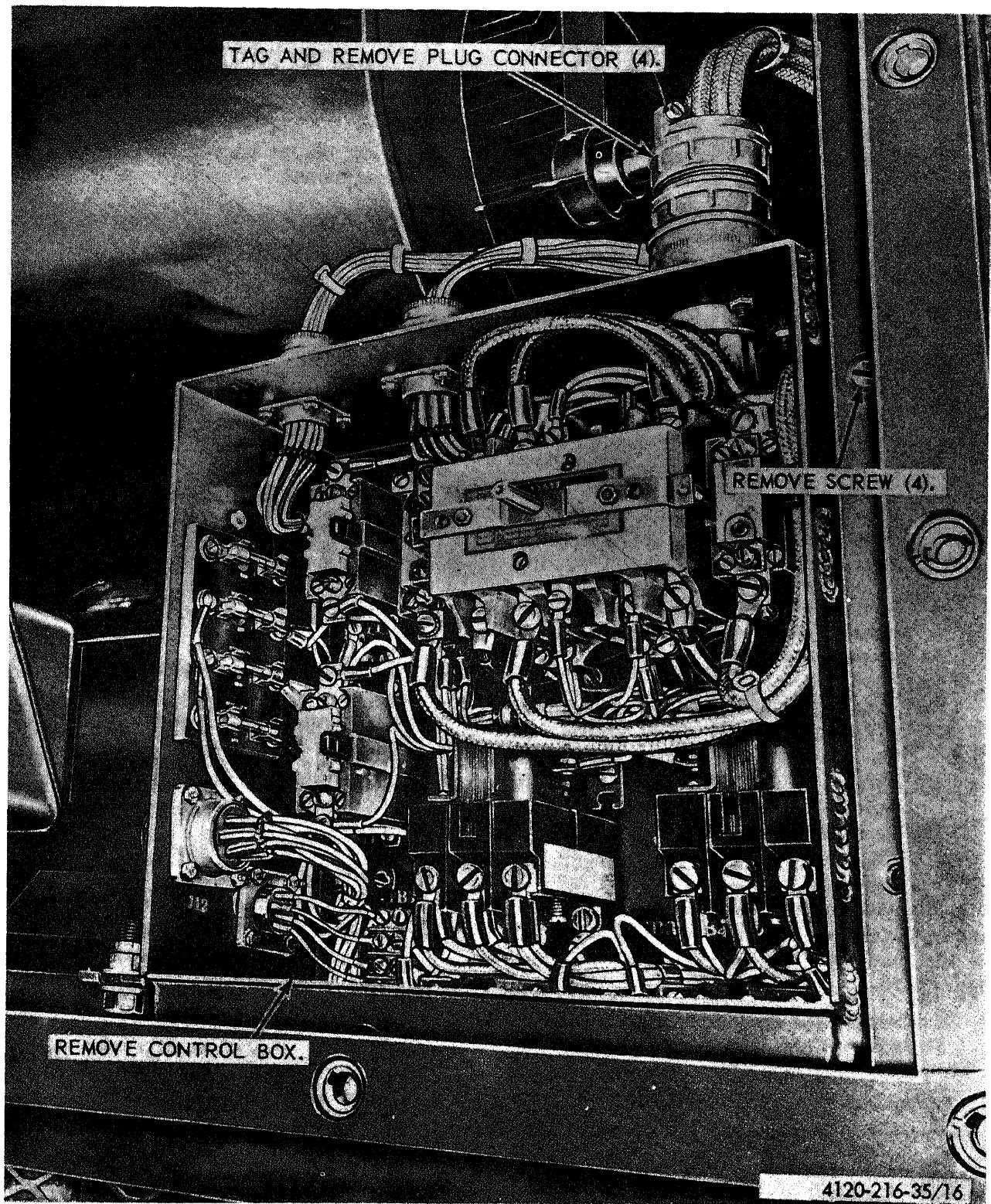


Figure 6-9. Compressor and condenser fan motors control box removal and installation.

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in the remote control panel in the reverse of the numerical sequence as illustrated on figure 6-8.

*b. Installation.*

(1) Install remote control panel and components in van in reverse of instructions on figure 6-7.

- (2) Position and secure all electrical leads on terminal board.
- (3) Install the power supply and remote control cable. See wiring diagram (fig. 1-4).
- (4) Close circuit breaker and operate air conditioner.

## Section IV. COMPRESSOR AND CONDENSER FAN MOTORS CONTROL BOX ASSEMBLY

### 6-15. General

The compressor and condenser fan motors' control box is the larger box secured at the back, inside of frame assembly. The compressor motor circuit breaker and heater overload relays, along with condenser motor, condenser motor contactors and heater overload relays, are in this control box. All wiring harness have a receptacle for the mating plug, to insure tight clean contact for the electrical components.

### 6-16. Compressor and Condenser Fan Motors Control Box Assembly, Removal and Disassembly

*a. Removal.*

- (1) Stop air conditioner and disconnect power supply and remote control cables from air conditioner (fig. 1-2).
- (2) Remove filter panel assembly from frame assembly (fig. 3-7).
- (3) Remove the compressor and condenser fan motors control box assembly as instructed on figure 6-9.

*b. Disassembly.* Disassemble the compressor and condenser fan motors control box assembly in the numerical sequence as instructed on figure 6-10.

### 6-17. Compressor and Condenser Fan Motors Control Box Assembly, Cleaning, Inspection, Repair and Test

*a. Cleaning.* Clean all parts with a cloth

dampened with an approved solvent and dry thoroughly.

*b. Inspection.* Inspect all parts and mounting hardware for nicks, cracks, wear, deterioration, and other damage.

*c. Repair.* Replace all unserviceable parts and components.

*d. Test.* Use a multimeter set on ohms scale and test transformer for shorts, and for continuity between each lead.

### 6-18. Compressor and Condenser Fan Motors Control Box Assembly, Reassembly and Installation

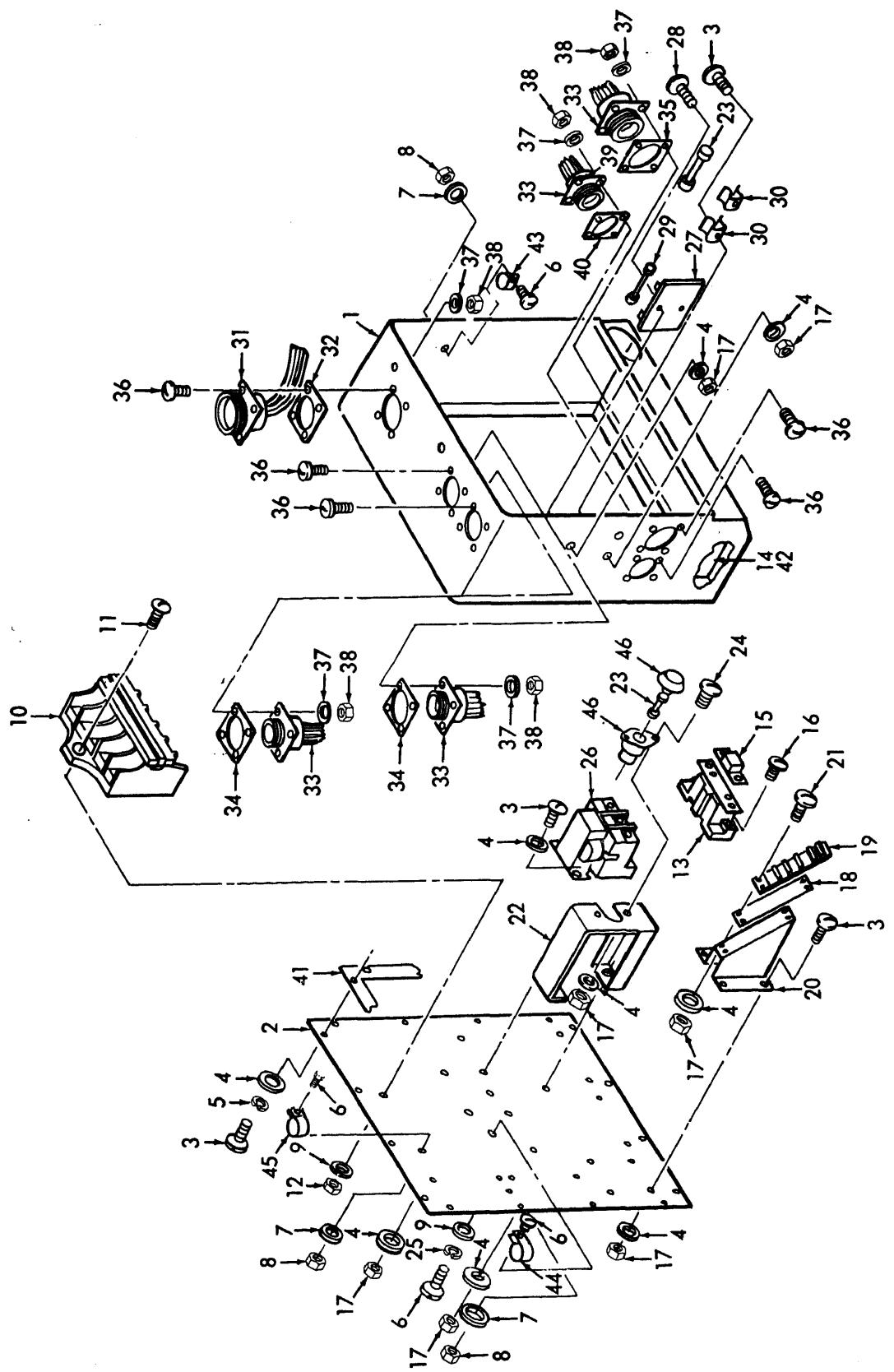
*a. Reassembly.* Reassemble compressor and condenser fan motors control box assembly in reverse of numerical sequence as illustrated on figure 6-10.

*b. Installation*

- (1) Install compressor and condenser fan motors control box assembly in reverse of instructions on figure 6-9.
- (2) Install filter panel assembly on frame assembly (fig. 3-7).
- (3) Connect remote control and power supply cables on air conditioner and start air conditioner (fig. 1-2).

|   |                     |    |                      |    |                      |    |                     |
|---|---------------------|----|----------------------|----|----------------------|----|---------------------|
| 1 | Frame               | 7  | Washer, flat (3)     | 13 | Relay, overload      | 19 | Terminal board      |
| 2 | Plate               | 8  | Nut, selflocking (3) | 14 | Heater, relay        | 20 | Bracket             |
| 3 | Screw, machine (16) | 9  | Washer, flat (16)    | 15 | Heater               | 21 | Screw, machine      |
| 4 | Washer, flat (16)   | 10 | Starter              | 16 | Machine screw (8)    | 22 | Bracket, fuseholder |
| 5 | Washer, lock (16)   | 11 | Screw, machine (3)   | 17 | Nut, selflocking (8) | 23 | Fuse                |
| 6 | Screw, machine (8)  | 12 | Nut, selflocking     | 18 | Marker strip         | 24 | Screw, machine (2)  |

Figure 6-10.—Continued



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|    |                |    |                             |    |                      |    |                    |
|----|----------------|----|-----------------------------|----|----------------------|----|--------------------|
| 25 | Washer, lock   | 29 | Fuse instrument, power, and | 32 | Gasket, machine      | 40 | Gasket             |
| 26 | Contactor      | 30 | Telephone                   | 33 | Washer, flat         | 41 | Gasket             |
| 27 | Panel, fuse    | 31 | Clip, fuse                  | 38 | Nut, selflocking     | 42 | Heater, relay (for |
| 28 | Screw, machine | 32 | Wiring harness              | 34 | Gasket               | 43 | Clamp, loop        |
|    |                | 35 |                             | 35 | Gasket               | 44 | Clamp, loop        |
|    |                | 36 |                             | 36 | Shell, cable sealing | 45 | Clamp, loop        |
|    |                | 37 |                             | 37 | 416 volt)            | 46 | Fuse holder        |

Figure 6-10. Compressor and condenser fan motor control box assembly, exploded view.

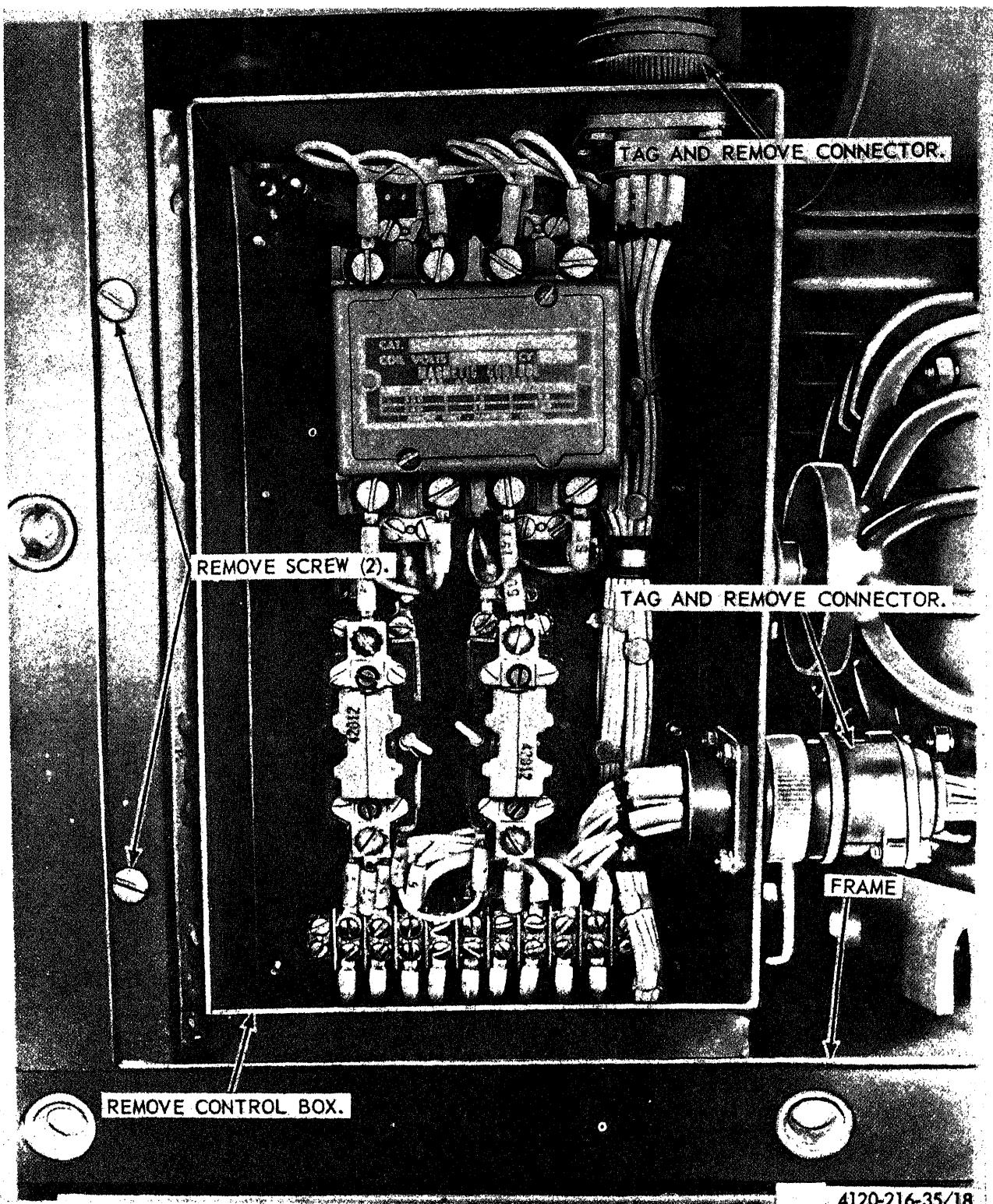


Figure 6-11. Evaporator fan motor control box, removal and installation.

## Section V. EVAPORATOR FAN MOTOR CONTROL BOX

### 6-19. General

The evaporator fan motor control box is the smaller control box located inside, and secured on, the frame assembly. Components located in the box are the evaporator fan motor heater overload relays, motor contactor, and the motor terminal board. Electrical receptacles and mating plugs assure positive electrical contact to and from the electrical control box.

### 6-20. Evaporator Fan Motor Control Box Removal and Disassembly

#### a. Removal.

- (1) Stop air conditioner and disconnect the remote control and power supply cables from air conditioner (fig. 1-2).
- (2) Remove filter panel assembly from frame assembly (fig. 3-7).
- (3) Remove evaporator fan motor control box as illustrated on figure 6-11.

#### b. Disassembly.

- (1) Disassemble the evaporator fan motor control box as instructed on figure 6-12.
- (2) Disassemble control box only to the

extent necessary to reach and replace the defective part.

### 6-21. Evaporator Fan Motor Control Box Cleaning, Inspection, and Repair

*a. Cleaning.* Clean all parts with a cloth dampened with an approved solvent and dry thoroughly.

*b. Inspection.* Inspect all parts and mounting hardware for nicks, cracks, wear, deterioration, and other damage.

*c. Repair.* Replace all unserviceable parts and components.

### 6-22. Evaporator Fan Motor Control Box Reassembly and Installation

*a. Reassembly.* Reassemble the evaporator fan motor as instructed on figure 6-12.

#### b. Installation.

- (1) Install evaporator fan motor control box in reverse of instructions on figure 6-11.
- (2) Install filter panel assembly on frame assembly (fig. 3-7).
- (3) Install power supply and remote control cables on air conditioner and start air conditioner (fig. 1-2).

## Section VI. TEMPERATURE PRESSURE CONTROL BOX

### 6-23. General

The temperature pressure control box is located behind the lower front panel. The components inside the box include a high pressure cutout switch, a low pressure cutout switch, a condenser fan high pressure switch, and a low pressure hot gas solenoid valve switch; each switch is adjustable and has an automatic reset button. The control circuit terminal board and condenser fan temperature switch are also in the box. The power supply terminal board is secured to back of the temperature control box.

### 6-24. Temperature Pressure Control Adjustments

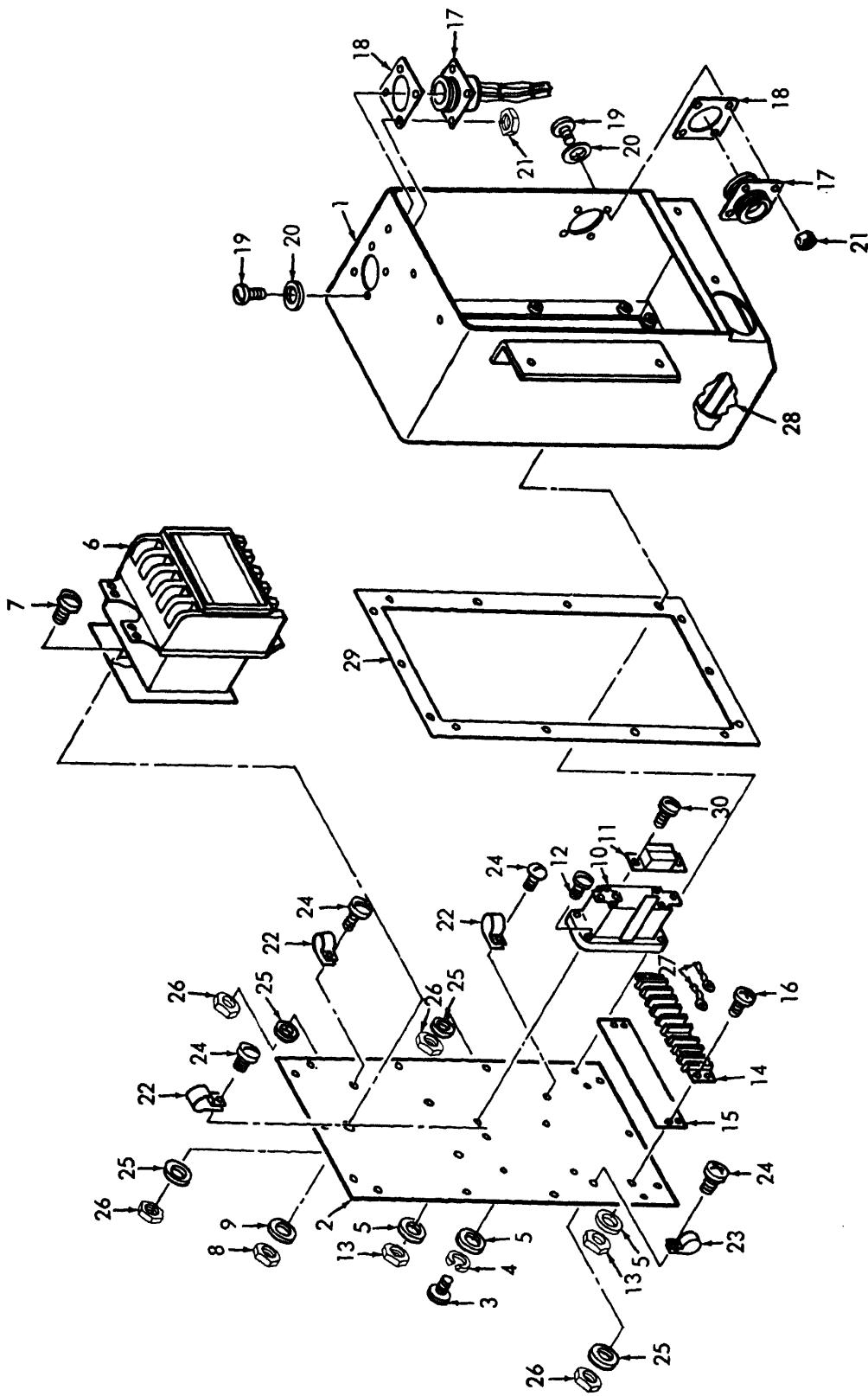
Each of the switches are preset. If adjustment is necessary turn left-hand adjustment screw, illustrated in figure 6-13, clockwise to

raise both cutin and cutout pressures. To raise only the cutout pressure, the right-hand adjustment screw is turned clockwise. All switches are adjusted in the same manner. When necessary adjust switches to value listed in table 6-1.

Table 6-1. Pressure Switch Setting

| Low Pressure Switch     | Range          |
|-------------------------|----------------|
| Cut-in point -----      | 23 to 27 psi   |
| Cutout point -----      | 3 to 3 psi     |
| High Pressure Switch    |                |
| Cut-in pressure -----   | 245 to 255 psi |
| Cutout pressure -----   | 270 to 290 psi |
| Condenser Fan Switch    |                |
| Cut-in pressure -----   | 175 to 185 psi |
| Cutout pressure -----   | 45 to 55 psi   |
| Hot Gas Solenoid Switch |                |
| Cut-in pressure -----   | 37 to 39 psi   |
| Cutout pressure -----   | 43 to 47 psi   |

Figure 6-12. Evaporator fan motor control box, disassembly and reassembly, exploded view.



|    |                                  |    |                                 |    |   |
|----|----------------------------------|----|---------------------------------|----|---|
| 1  | Frame                            | 11 | Overload relay heater (2)       | 21 | Nut, hex, 4-40 (8)                        |
| 2  | Cover plate                      | 12 | Screw, 6-32 x 1 (4)             | 22 | Clamp (3)                                 |
| 3  | Screw, 6-32 x $\frac{1}{2}$ (14) | 13 | Nut, hex 6-32 (4)               | 23 | Clamp (1)                                 |
| 4  | Washer, lock No. 6 (14)          | 14 | Terminal board                  | 24 | Screw, 8-32 x $\frac{5}{8}$ (4)           |
| 5  | Washer, flat (14)                | 15 | Marker strip                    | 25 | Washer, flat (4)                          |
| 6  | Contractor                       | 16 | Screw, 6-32 x $\frac{3}{4}$ (2) | 26 | Nut, hex (4)                              |
| 7  | Screw, 10-32 x $\frac{1}{2}$ (3) | 17 | Wiring harness                  | 27 | Jumper (2)                                |
| 8  | Nut, hex, 10-32 (3)              | 18 | Gasket (2)                      | 28 | Heater (2) for 416<br>voltage wiring only |
| 9  | Washer, flat (3)                 | 19 | Screw, 4-40 x $\frac{5}{8}$ (8) | 29 | Gasket                                    |
| 10 | Overload relay (2)               | 20 | Washer, flat (8)                | 30 | Screw 10-32 x $\frac{5}{8}$ (4)           |

Figure 6-12.—Continued.

## 6-25. Temperature Pressure Control Box Removal and Disassembly

### a. Removal.

- (1) Pump down refrigerant (para 6-3).
- (2) Stop air conditioner operation. Disconnect remote control and power supply cables from plugs on air conditioner (fig. 1-2).
- (3) Remove panels (fig. 3-7).
- (4) Remove temperature pressure control box as instructed on figure 6-14.

**Warning:** Avoid bodily contact with refrigerant (R-12). Do not inhale or allow it to contact the eyes.

**Caution:** Cap the lines when a valve or tube section is removed. Keep foreign matter out of refrigeration system.

### b. Disassembly.

- (1) Disassemble temperature pressure control box as instructed on figure 6-15.
- (2) Disassemble control box only to the extent necessary to reach and replace the defective part.

**Note.** Remove and replace only the unserviceable components.

## 6-26. Temperature Pressure Control Box Cleaning, Inspection, and Repair

**a. Cleaning.** Clean all parts with a cloth dampened with an approved solvent and dry thoroughly.

**b. Testing.** Set the multimeter on ohms and touch test leads to the multimeter to the two terminals on switch to be tested. Place 50 psig dry nitrogen pressure into capillary tubing of the switch being tested. Continuity on multimeter should exist.

**c. Inspection.** Inspect all wiring, lugs, hardware, switches, components, and the terminal board for cracks, breaks, wear, and deterioration.

**d. Repair.** Replace all unserviceable components and parts.

## 6-27. Temperature Pressure Control Box Reassembly and Installation

**a. Reassembly.** Reassemble temperature pressure control box in reverse of numerical sequence as illustrated on figure 6-15.

### b. Installation.

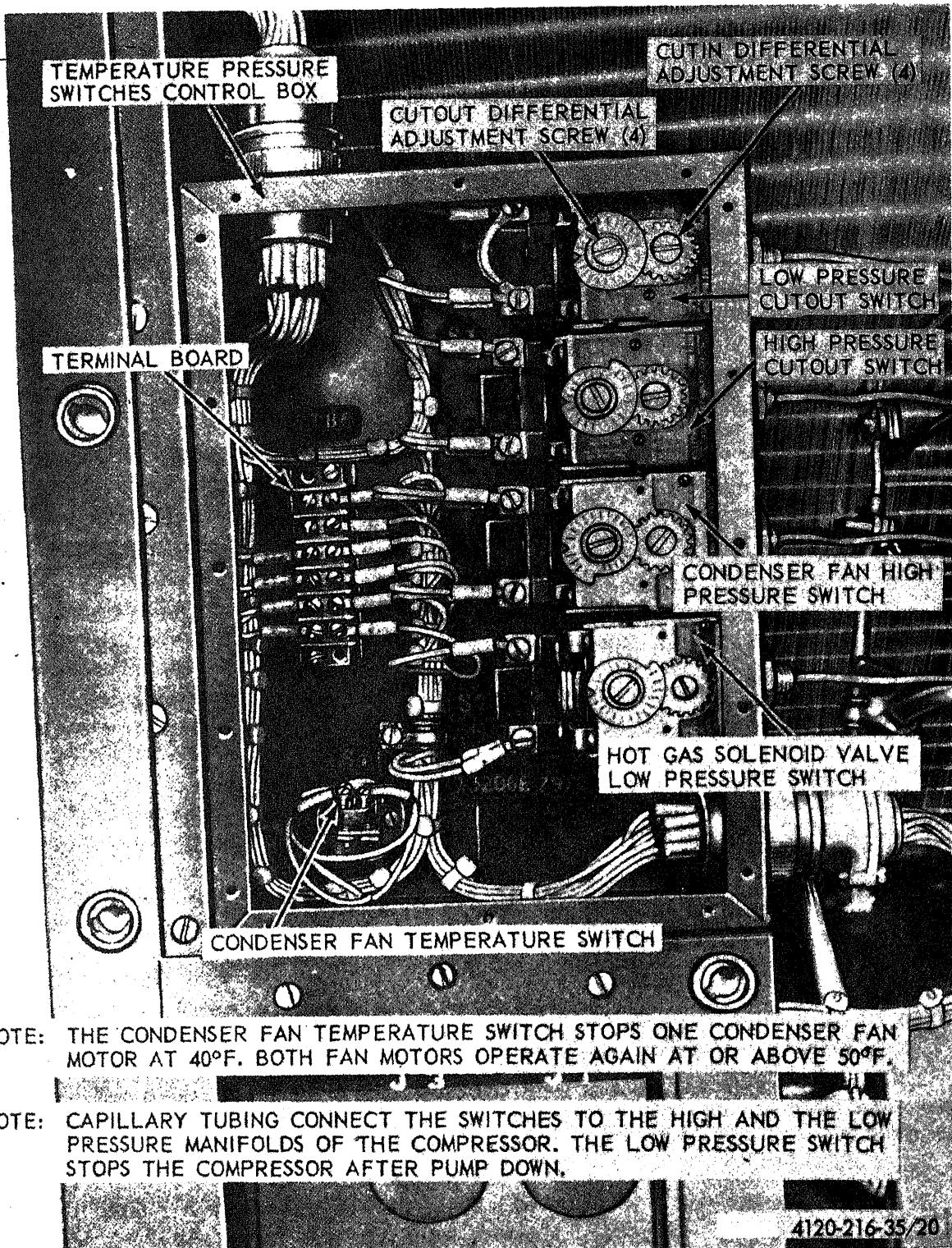
- (1) Install temperature pressure control box in reverse of instructions on figure 6-14.
- (2) Install power supply and remote control cables on air conditioner (fig. 1-2).
- (3) Purge refrigeration system (para 6-5).
- (4) Charge refrigeration system (para 6-6).
- (5) Install side panels (fig. 3-9).
- (6) Adjust the temperature controls (para 6-24.)

## Section VII. ELECTRICAL PLUGS, RECEPTACLES, LOOP CLAMPS, TERMINAL BOARDS, AND WIRING HARNESS

### 6-28. General

The electrical system is interlocked with the refrigerant tubing circuit and other sensing

components that control the air conditioner. All terminal boards, wiring harness, electrical plugs and receptacles, with numbered wiring

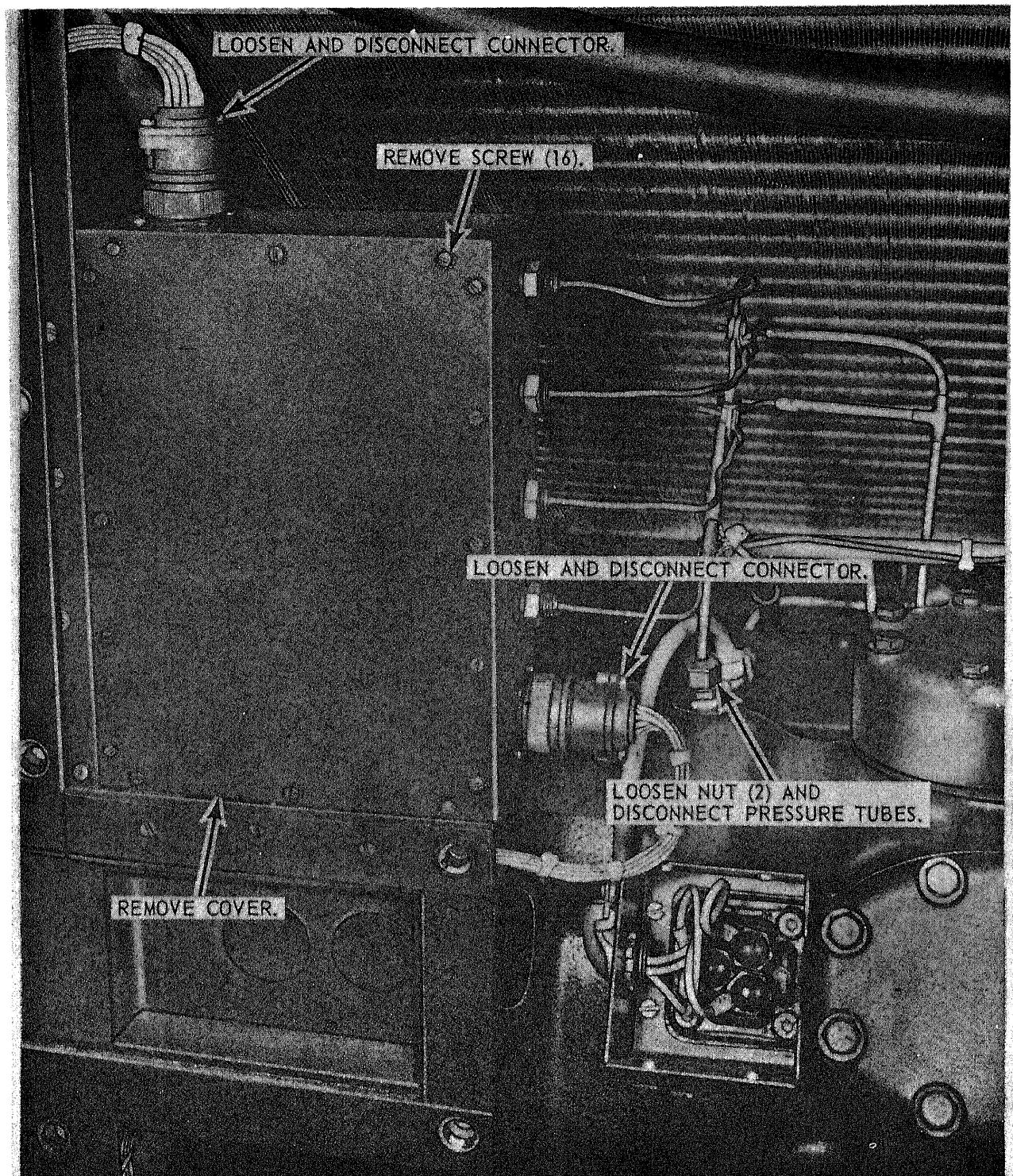


NOTE: THE CONDENSER FAN TEMPERATURE SWITCH STOPS ONE CONDENSER FAN MOTOR AT 40°F. BOTH FAN MOTORS OPERATE AGAIN AT OR ABOVE 50°F.

NOTE: CAPILLARY TUBING CONNECT THE SWITCHES TO THE HIGH AND THE LOW PRESSURE MANIFOLDS OF THE COMPRESSOR. THE LOW PRESSURE SWITCH STOPS THE COMPRESSOR AFTER PUMP DOWN.

4120-216-35/20

Figure 6-18. Pressure control adjustment points.

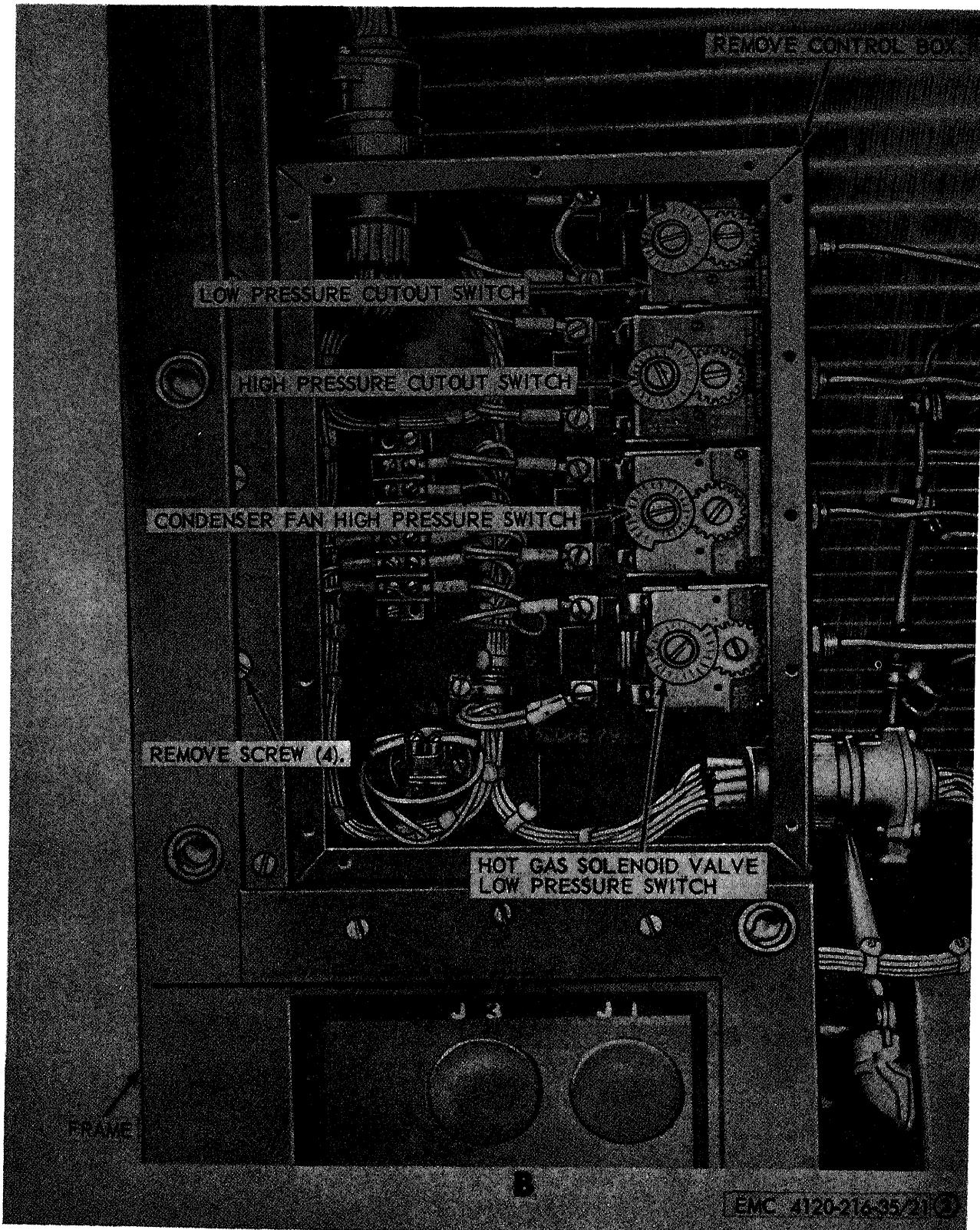


A

4120-216-35/21 ①

*A. Cover removal.*

*Figure 6-14 ①. Temperature pressure control box, removal and installation.*

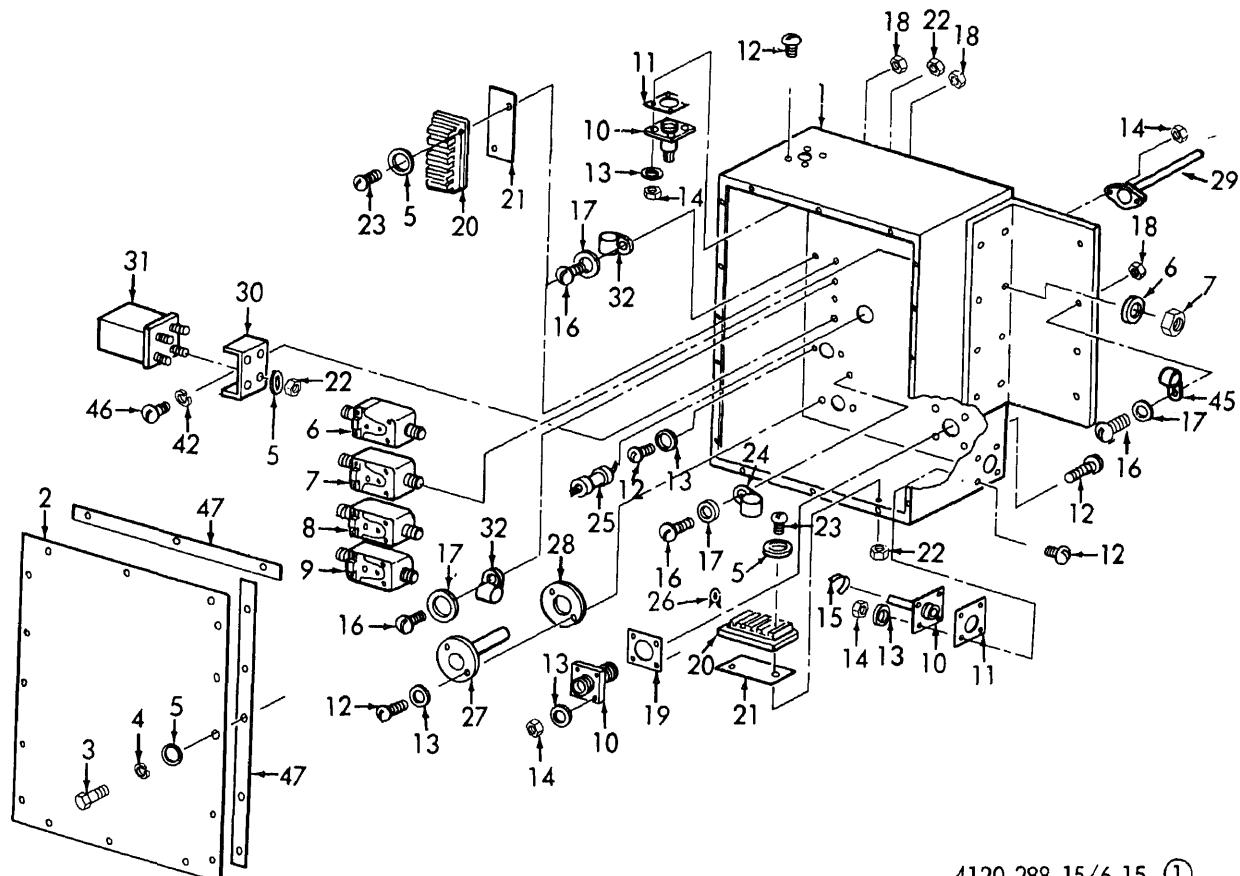


*B. Control box, removal.*  
Figure 6-14 ④.—Continued.

leads are shown on the wiring diagram (fig. 1-4) along with all other electrical components. Replace the wire number when damaged so that the numbered wire always corresponds with the wiring diagram (fig. 1-4).

## 6-29. Electrical Plugs, Receptacles, Loop Clamps, Terminal Boards, and Wiring Harness Removal

a. Stop air conditioner and disconnect remote control cable and power supply cable from plugs on air conditioner (fig. 2-1).



4120-288-15/6-15 ①

|    |   |    |   |    |   |
|----|---|----|---|----|---|
| 1  | Control box, temperature and pressure switch  | 17 | Washer, flat (2)                                  | 36 | Marker, strip                                 |
| 2  | Cover   | 18 | Nut, selflocking (2)                              | 37 | Terminal board                                |
| 3  | Screw, machine 6-32 x $\frac{1}{2}$ (16)      | 19 | Gasket  | 38 | Cover   |
| 4  | Washer, lock (16)                             | 20 | Terminal board                                    | 39 | Gasket  |
| 5  | Washer, flat (16)                             | 21 | Marker strip                                      | 40 | Terminal                                      |
| 6  | Switch, low pressure, cutout, compressor      | 22 | Nut, selflocking                                  | 41 | Washer  |
| 7  | Switch, high pressure, cutout: compressor     | 23 | Screw, machine 6-32 UNC-2A x $\frac{3}{8}$ LG (4) | 42 | Washer, lock                                  |
| 8  | Switch, high pressure, condenser fan          | 24 | Clamp, loop                                       | 43 | Jumper  |
| 9  | Switch, low pressure, hot gas solenoid valve  | 25 | Capacitor   | 44 | Jumper  |
| 10 | Wiring harness                                | 26 | Bushing, relief                                   | 45 | Clamp, cushioned support                      |
| 11 | Gasket  | 27 | Temperature switch                                | 46 | Screw, machine 4-40 UNC-2A x $\frac{3}{8}$ LG |
| 12 | Screw 2A x $\frac{5}{8}$ LG (94)              | 28 | Gasket  | 47 | Gasket  |
| 13 | Washer, flat (4)                              | 29 | Relay assembly                                    | 48 | Capacitor bypass                              |
| 14 | Nut, selflocking                              | 30 | Bracket   | 49 | Capacitor bypass                              |
| 15 | Strap, cable                                  | 31 | Relay assembly                                    | 50 | Capacitor bypass                              |
| 16 | Screw, machine 8-32 2A x $\frac{1}{2}$ LG (2) | 32 | Clamp, loop                                       | 51 | Screw, machine                                |
|    |   | 33 | Screw, machine 6-32 x $\frac{1}{2}$ (4)           | 52 | Washer, flat (3)                              |
|    |   | 34 | Jumper  | 53 | Washer, lock                                  |
|    |   | 35 | Screw, machine 6-32 UNC-2A x $\frac{3}{8}$ LG (2) | 54 | Jumper  |
|    |   |    |   | 55 | Mount   |

Figure 6-15 ①. Temperature pressure control box, disassembly and reassembly, exploded view.

b. Disconnect electrical receptacles from evaporator and condenser fan motors (figs. 3-15 and 3-17).

c. Tag and disconnect all electrical leads and jumper wires from terminal boards on air conditioner (paras 2-5 and 2-6).

d. Remove wiring harness, terminal boards, loop clamps, receptacles, and plugs as instructed on figure 6-16.

## 6-30. Electrical Plugs, Receptacles, Loop Clamps, Terminal Boards, and Wiring Harness Cleaning, Inspection, and Repair

a. *Cleaning.* Clean all parts with an approved solvent and dry thoroughly.

*b. Inspection.* Inspect all parts for breaks, cracks, wear, and other damage.

*c. Repair.* Replace all unserviceable parts.

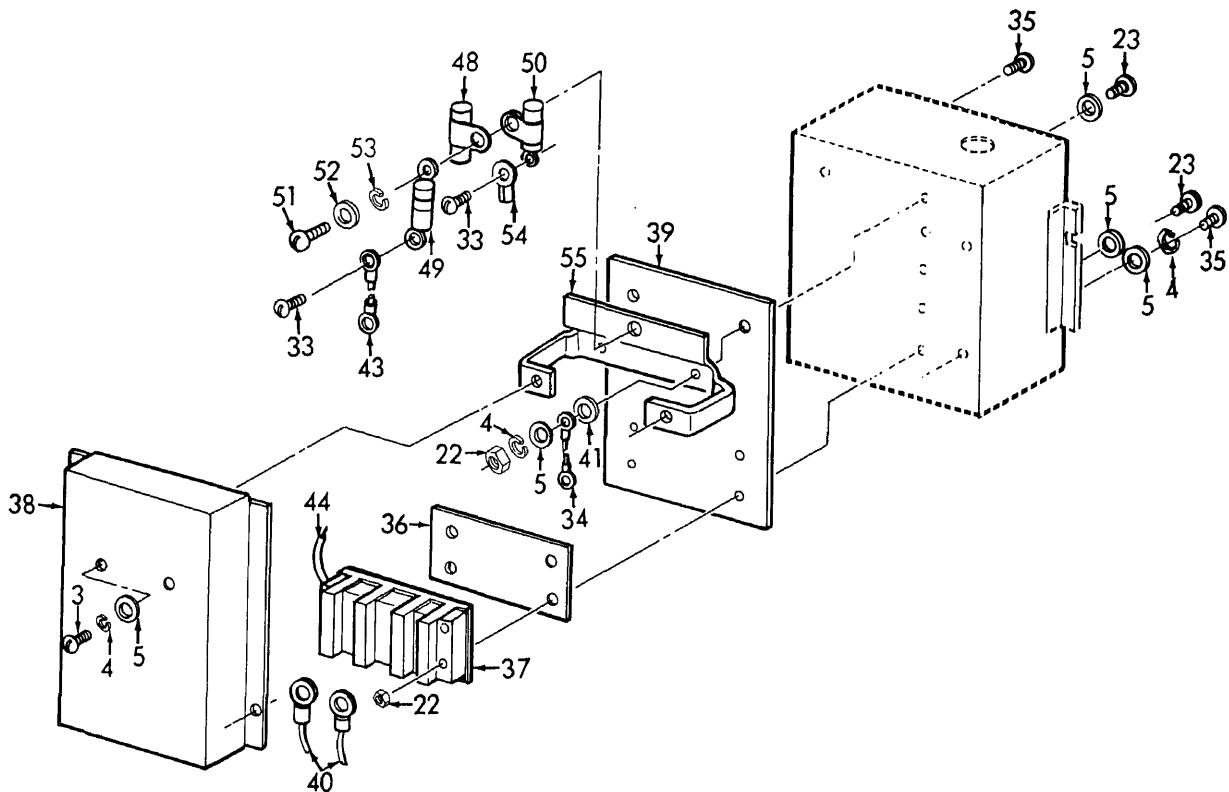
## 6-31. Electrical Plugs, Receptacles, Loop Clamps, Terminal Boards, and Wiring Harness Installation

a. Install plugs, receptacles, wiring harness, terminal boards, and loop clamps on the air conditioner in reverse of instructions on figure 6-16.

b. Connect all electrical leads and jumper wires on the ten terminal boards on air conditioner (paras 2-5 and 2-6).

c. Connect electrical receptacles on condenser fan motors and evaporator motor (figs. 3-15 and 3-17).

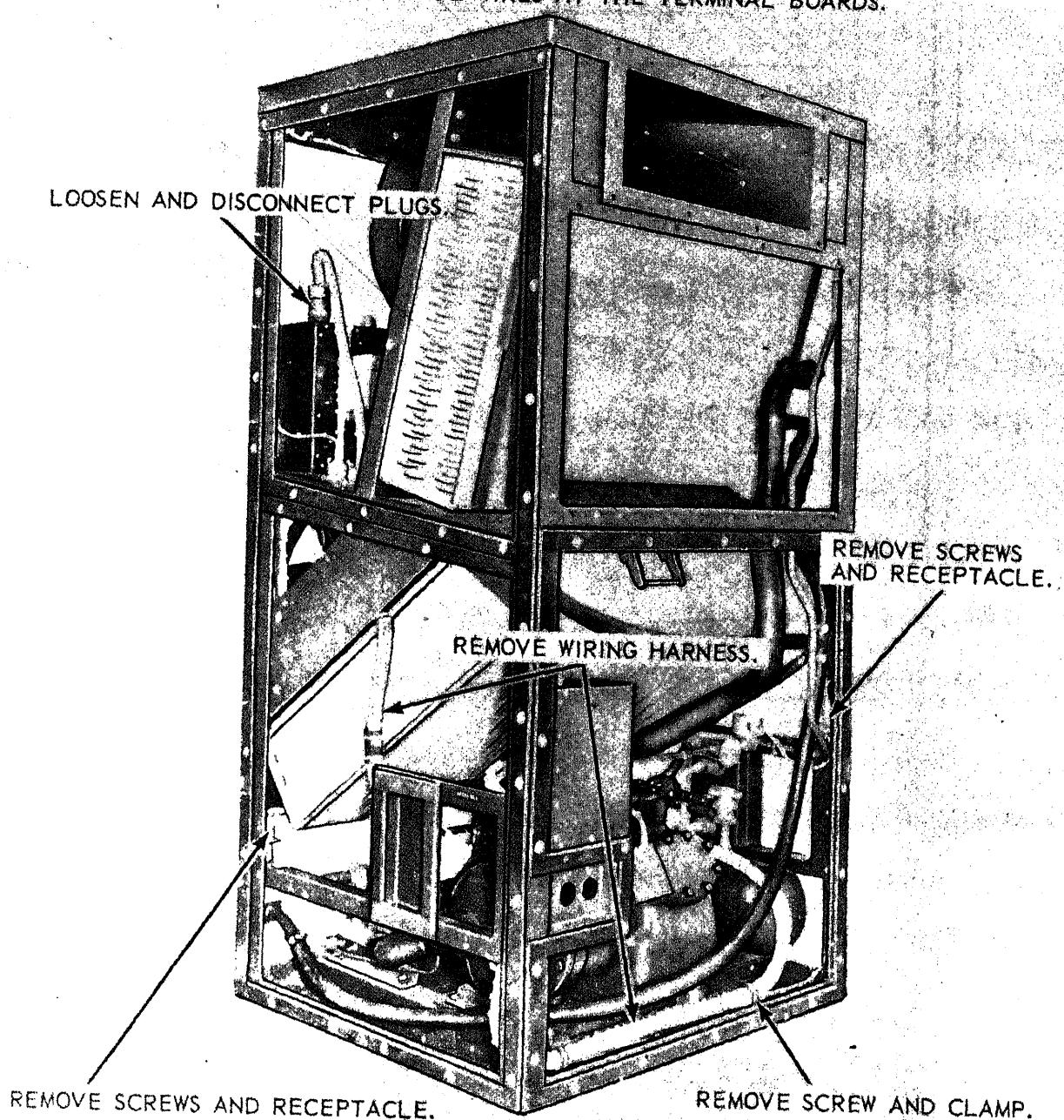
d. Connect remote control and power supply cables on the air conditioner and start air conditioner (fig. 2-4). Add refrigerant as necessary.



4120-288-15/6-15 (2)

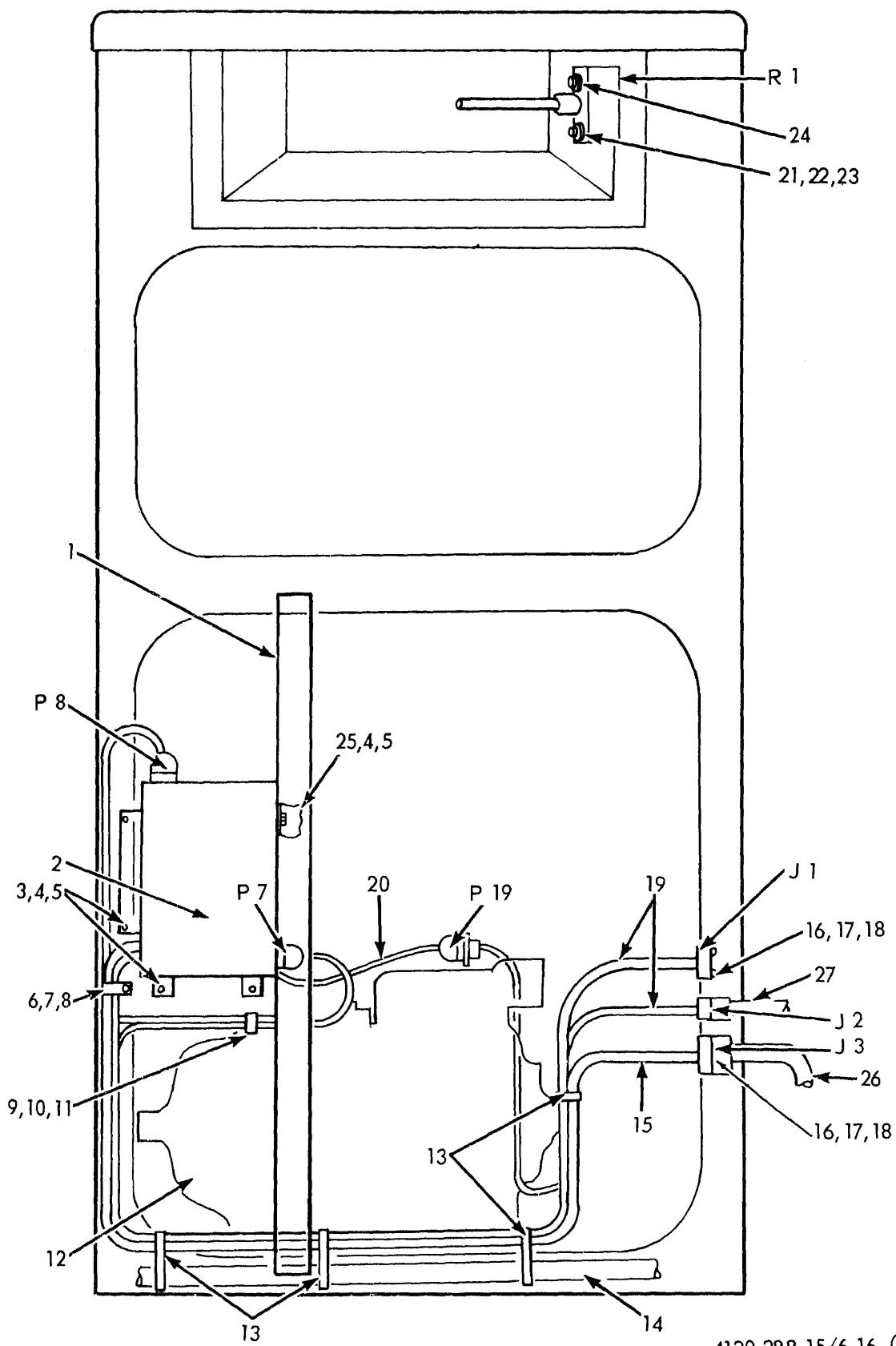
Figure 6-15 ②.—Continued.

NOTE: LOOSEN AND DISCONNECT ALL WIRING HARNESS IN A SIMILAR MANNER.  
NOTE: TAG AND DISCONNECT ALL WIRES AT THE TERMINAL BOARDS.



4120-216-35/23

Figure 6-16 ①. Electrical plugs, receptacles, loop clamps, terminal boards, and wiring harness, removal and installation.



4120-288-15/6-16 ②

Figure 6-16 ②.—Continued.

|    |   |    |  |     |                              |
|----|---|----|--|-----|------------------------------|
| 1  | Brace   | 12 | Compressor assembly                                | 22  | Washer, flat (2)             |
| 2  | Control box assembly, temperature and pressure switch | 13 | Strap, cable (4)                                   | 23  | Nut, selflocking (2)         |
| 3  | Screw, machine (4)                                    | 14 | Tube, liquid line                                  | 24  | Sensing element, temperature |
| 4  | Washer, flat (7)                                      | 15 | Wiring harness, main power connection (J3 and TB5) | 25  | Screw, machine (3)           |
| 5  | Nut, selflocking (7)                                  | 16 | Screw, machine (8)                                 | 26  | Cable assembly               |
| 6  | Nut, selflocking (1)                                  | 17 | Washer, flat (8)                                   | 27  | Cable, remote control        |
| 7  | Screw, machine (1)                                    | 18 | Nut, selflocking (8)                               | J1  | Connector, receptacle        |
| 8  | Clamp, loop (1)                                       | 19 | Wiring harness, receptacles (J1 and J2) plug P7    | J2  | Connector, receptacle        |
| 9  | Clamp, loop (1)                                       | 20 | Wiring harness, connectors P18 and P19             | J3  | Connector, receptacle        |
| 10 | Screw, machine (1)                                    | 21 | Screw, machine (2)                                 | P7  | Connector, plug              |
| 11 | Nut, selflocking (1)                                  |    |  | P8  | Connector, plug              |
|    |   |    |  | R19 | Connector, plug              |
|    |   |    |  | R1  | Element, temperature sensing |

Figure 6-16 ②.—Continued

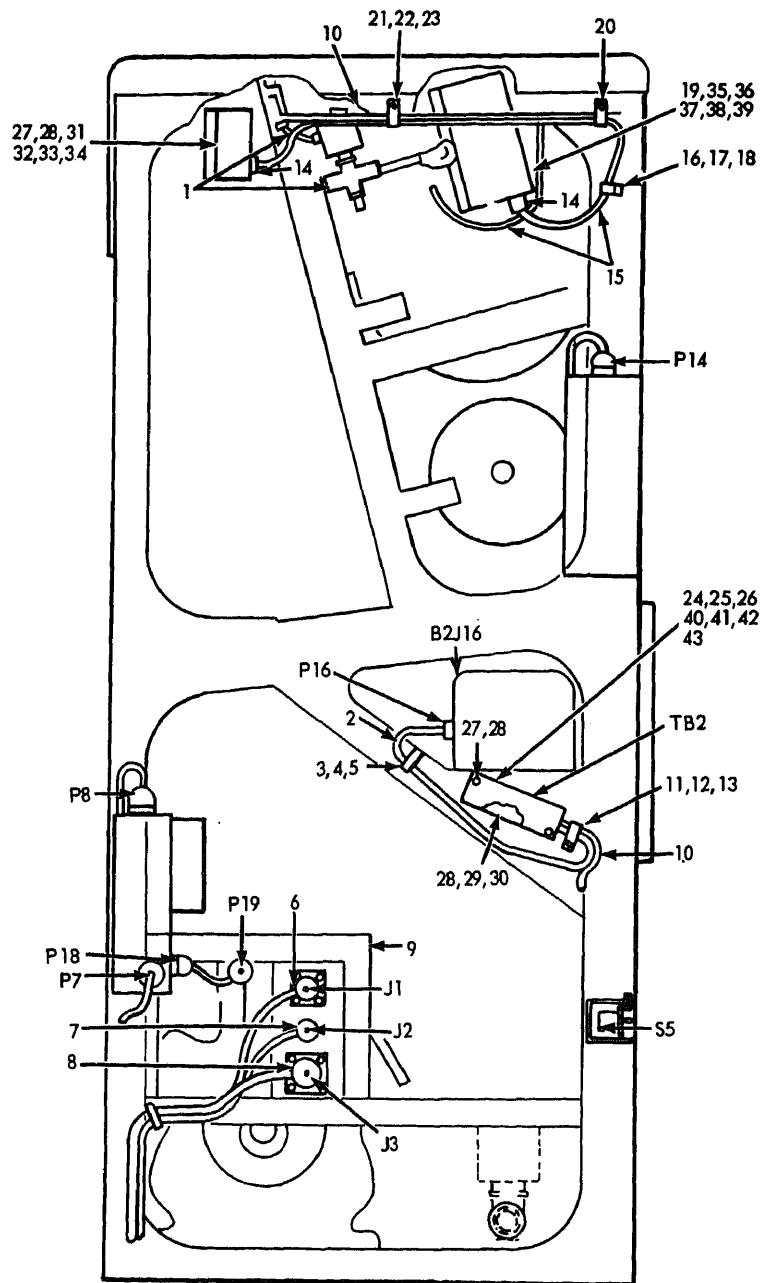
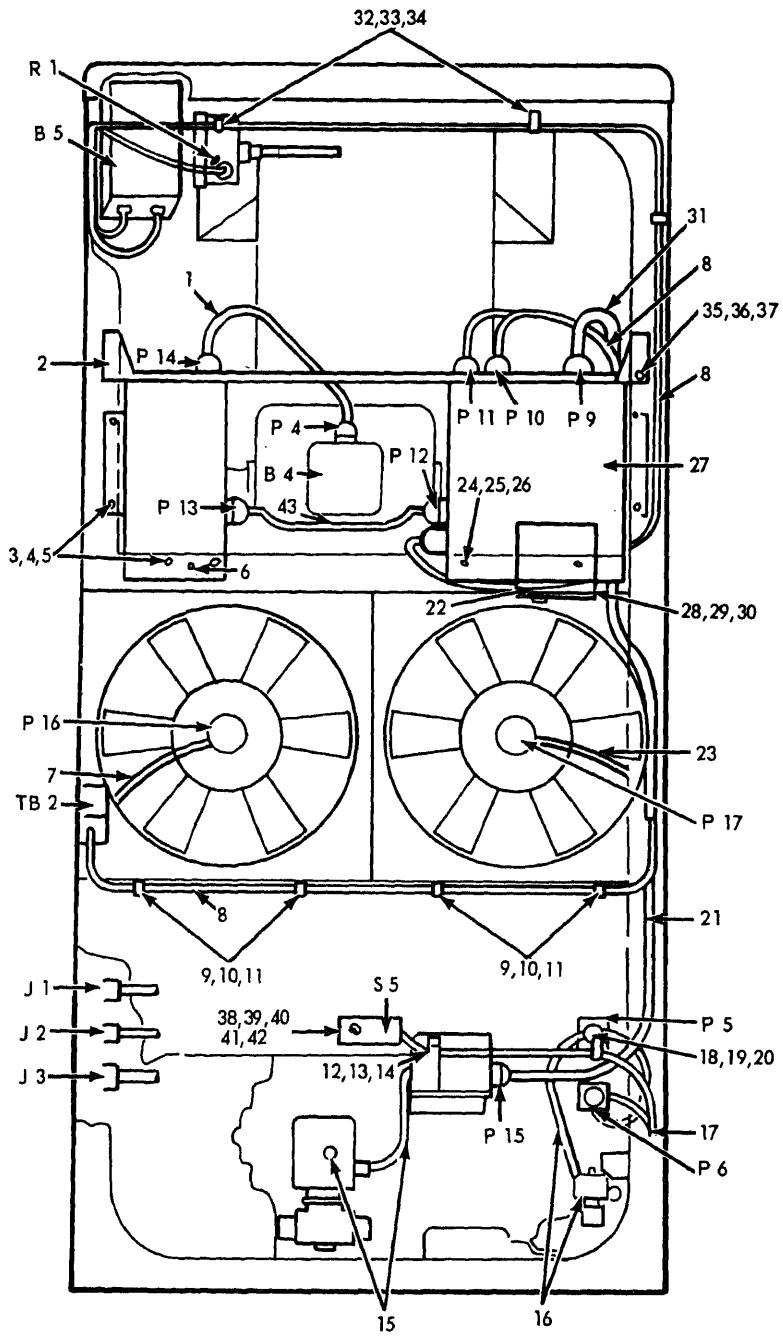


Figure 6-16 ③.—Continued.

|    |   |    |                            |     |                        |
|----|---|----|----------------------------|-----|------------------------|
| 1  | Wiring harness, solenoid valve<br>KX3               | 16 | Clamp, loop (1)            | 37  | Washer, flat           |
| 2  | Wiring harness, conn. P16 and<br>terminal board TB2 | 17 | Screw, machine (1)         | 38  | Washer, lock           |
| 3  | Nut, selflocking (1)                                | 18 | Nut, selflocking (1)       | 39  | Nut, selflocking       |
| 4  | Screw, machine (1)                                  | 19 | Valve, motor operated (B5) | 40  | Jumper                 |
| 5  | Clamp, loop (1)                                     | 20 | Screw, machine (1)         | 41  | Jumper                 |
| 6  | Cap, electrical: connector re-<br>ceptacle          | 21 | Clamp, loop (1)            | 42  | Jumper                 |
| 7  | Cap, electrical: connector re-<br>ceptacle          | 22 | Screw, machine (2)         | 43  | Jumper                 |
| 8  | Cap, protective: connector<br>coupling              | 23 | Nut, selflocking (1)       | B2  | Condenser fan assembly |
| 9  | Box, right-hand                                     | 24 | Board, terminal            | J1  | Connector, receptacle  |
| 10 | Wiring harness, connectors<br>P10-P11               | 25 | Marker strip               | J2  | Connector, receptacle  |
| 11 | Clamp, loop (1)                                     | 26 | Gasket                     | J3  | Connector, receptacle  |
| 12 | Screw, machine (1)                                  | 27 | Screw, machine (2)         | J16 | Connector, receptacle  |
| 13 | Nut, selflocking (1)                                | 28 | Nut, selflocking (7)       | P7  | Connector, plug        |
| 14 | Clamp, straight (2)                                 | 29 | Cover                      | P8  | Connector, plug        |
| 15 | Cable assembly, shielded                            | 30 | Screw, machine (8)         | P14 | Connector, plug        |
|    |   | 31 | Terminal board             | P16 | Connector, plug        |
|    |   | 32 | Marker strip               | P18 | Connector, plug        |
|    |   | 33 | Cover                      | P19 | Connector, plug        |
|    |   | 34 | Screw, machine (2)         | S5  | Switch, toggle         |
|    |   | 35 | Screw, machine             | TB2 | Board, terminal        |
|    |   | 36 | Washer, flat (2)           |     |                        |

Figure 6-16 ⑧.—Continued.

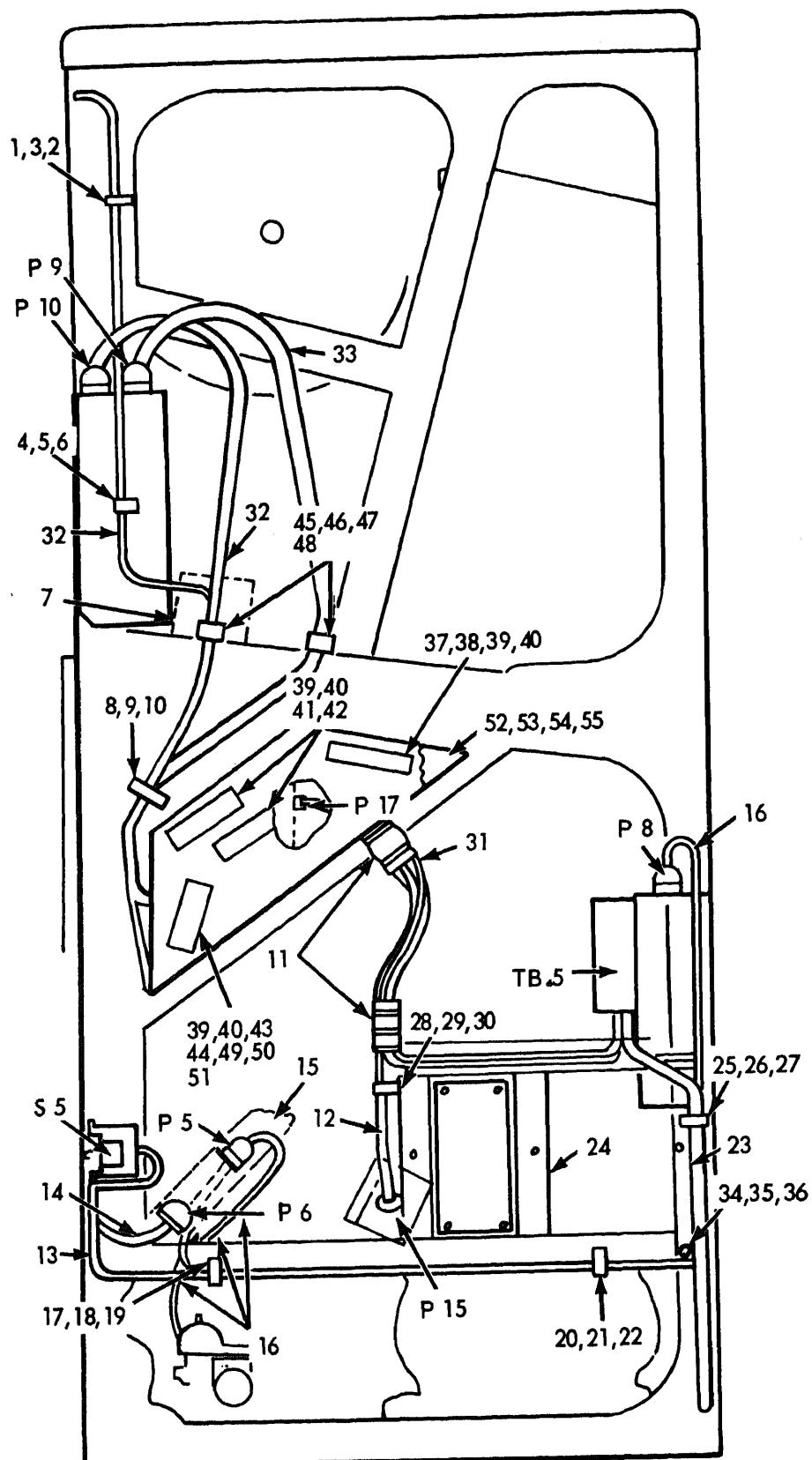


4120-288-15/6-16 (4)

Figure 6-16 (4).—Continued.

|    |   |    |   |     |  |
|----|---|----|---|-----|--|
| 1  | Wiring harness, connectors<br>P4 and P14            | 20 | Nut, selflocking (11)   | 39  | Grommet                                |
| 2  | Brace   | 21 | Wiring harness, connectors<br>(P15) and terminal board<br>(TB8, TB9 & TB10) | 40  | Screw, machine (3)                     |
| 3  | Screw, machine (4)                                  | 22 | Transformer and cable clamp<br>assembly                                     | 41  | Washer, lock (3)                       |
| 4  | Washer, flat (4)                                    | 23 | Wiring harness, connectors<br>(P17) and terminal board<br>(TB3)             | 42  | Box                                    |
| 5  | Nut, selflocking (4)                                | 24 | Screw, machine (2)  | 43  | Wiring harness connectors<br>P12 & P13 |
| 6  | Control box assembly, evap-<br>orator fan section   | 25 | Washer, flat (2)  | B4  | Evaporator fan motor                   |
| 7  | Wiring harness, conn. P16<br>and terminal board TB2 | 26 | Nut, selflocking (2)  | B5  | Valve, motor operated                  |
| 8  | Wiring harness, connectors<br>P10-P11               | 27 | Control box assembly, con-<br>denser fan section                            | J1  | Connector, receptacle                  |
| 9  | Clamp, loop (4)                                     | 28 | Nut, selflocking (5)  | J2  | Connector, receptacle                  |
| 10 | Screw, machine (4)                                  | 29 | Washer, flat (5)  | J3  | Connector, receptacle                  |
| 11 | Nut, selflocking (4)                                | 30 | Screw, machine (5)  | P4  | Connector, plug                        |
| 12 | Clamp, loop (1)                                     | 31 | Wiring harness, connectors<br>P9 and TB8                                    | P5  | Connector, plug                        |
| 13 | Screw, machine (1)                                  | 32 | Clamp, loop (2)   | P6  | Connector, plug                        |
| 14 | Nut, selflocking (1)                                | 33 | Screw, machine (2)  | P9  | Connector, plug                        |
| 15 | Wiring harness, solenoid<br>valve KX1               | 34 | Nut, selflocking (2)  | P10 | Connector, plug                        |
| 16 | Wiring harness, solenoid<br>valve KX2               | 35 | Screw, machine (4)  | P11 | Connector, plug                        |
| 17 | Wiring harness, receptacles<br>(J1 and J2)          | 36 | Washer, flat (4)  | P12 | Connector, plug                        |
| 18 | Clamp, loop (1)                                     | 37 | Nut, selflocking (4)  | P13 | Connector, plug                        |
| 19 | Screw, machine (1)                                  | 38 | Box   | P14 | Connector, plug                        |
|    |   |    |   | P15 | Connector, plug                        |
|    |   |    |   | P16 | Connector, plug                        |
|    |   |    |   | P17 | Connector, plug                        |
|    |   |    |   | R1  | Element, temp. sensing                 |
|    |   |    |   | S5  | Switch, toggle                         |
|    |   |    |   | TB2 | Board, terminal                        |

Figure 8-16. ④.—Continued.



4120-288-15/6-16 ⑤

Figure 6-16 ⑤.—Continued.

|    |  |    |   |     |                        |
|----|--|----|---|-----|------------------------|
| 1  | Clamp, loop (1)  | 19 | Nut, selfflocking (1)                                 | 40  | Nut, selfflocking (10) |
| 2  | Screw, machine (1)   | 20 | Clamp, loop (1)                                       | 41  | Terminal board (2)     |
| 3  | Nut, selfflocking (1)  | 21 | Screw, machine (1)                                    | 42  | Marker strip (2)       |
| 4  | Clamp, loop (1)  | 22 | Nut, selfflocking (1)                                 | 43  | Terminal board         |
| 5  | Screw, machine (1)   | 23 | Wiring harness, main power<br>connection (J3 and TB5) | 44  | Marker strip           |
| 6  | Nut, selfflocking (1)  | 24 | Box, left hand  | 45  | Gasket (2)             |
| 7  | Transformer and cable clamp<br>assembly                                      | 25 | Clamp, loop (1)                                       | 46  | Screw, machine (8)     |
| 8  | Nut, selfflocking (1)  | 26 | Screw, machine (1)                                    | 47  | Washer, flat (8)       |
| 9  | Screw, machine (1)   | 27 | Nut, selfflocking (1)                                 | 48  | Nut, selfflocking (8)  |
| 10 | Clamp, loop (1)  | 28 | Clamp, loop (1)                                       | 49  | Jumper                 |
| 11 | Strap cable (4)  | 29 | Screw, machine (1)                                    | 50  | Jumper                 |
| 12 | Wiring harness, connectors<br>(P15) and terminal board<br>(TB8, TB9, & TB10) | 30 | Nut, selfflocking (1)                                 | 51  | Jumper                 |
| 13 | Wiring harness, receptacles<br>(J1 and J2), plug P7                          | 31 | Wiring harness, terminal<br>board (TB5 to TB8)        | 52  | Gasket                 |
| 14 | Control box assembly, evap-<br>orator fan section                            | 32 | Wiring harness connectors<br>P10-P11                  | 53  | Cover                  |
| 15 | Wiring harness, solenoid<br>valve KX2  | 33 | Wiring harness connectors<br>P9 and TB8               | 54  | Screw, machine (4)     |
| 16 | Wiring harness, connectors<br>(P8, P5, & P6)                                 | 34 | Screw, machine (4)                                    | 55  | Washer, lock (4)       |
| 17 | Clamp, loop (1)  | 35 | Washer, flat (4)                                      | P5  | Connector, plug        |
| 18 | Screw, machine (1)   | 36 | Nut, selfflocking (4)                                 | P6  | Connector, plug        |
|    |  | 37 | Terminal board  | P8  | Connector, plug        |
|    |  | 38 | Marker strip  | P9  | Connector, plug        |
|    |  | 39 | Screw, machine (10)                                   | P10 | Connector, plug        |
|    |  |    |   | P15 | Connector, plug        |
|    |  |    |   | P17 | Connector, plug        |
|    |  |    |   | S5  | Switch, toggle         |
|    |  |    |   | TB5 | Board, terminal        |

Figure 6-16 ⑤.—Continued.

## Section VIII. COMPRESSOR SUCTION SERVICE VALVE AND TUBE

### 6-32. General

The compressor suction service valve is mounted on the compressor housing and soldered to refrigeration suction tubing. The suction service valve must be open for operation but closed when in storage. The valve is designed with a port plug that is removed when charging, discharging, or purging the refrigeration system. The suction line draws liquid from the evaporator coil through the suction service valve into the compressor. All refrigerant in the system must pass through the manually operated suction service valve before being compressed and released into the system hot gas tubing.

### 6-33. Compressor Suction Service Valve and Tube Removal

a. Remove left side panel from frame assembly (fig. 3-9).

b. Pump down refrigerant (para 6-3).

c. Remove suction service valve and tube as instructed on figure 6-17.

**Caution:** Wrap tubing with a suitable material near area that is being unsoldered and soak wrapping with water to avoid overheating.

**Note.** Cap the lines when a valve or tube section is removed. Keep foreign matter out of refrigeration system.

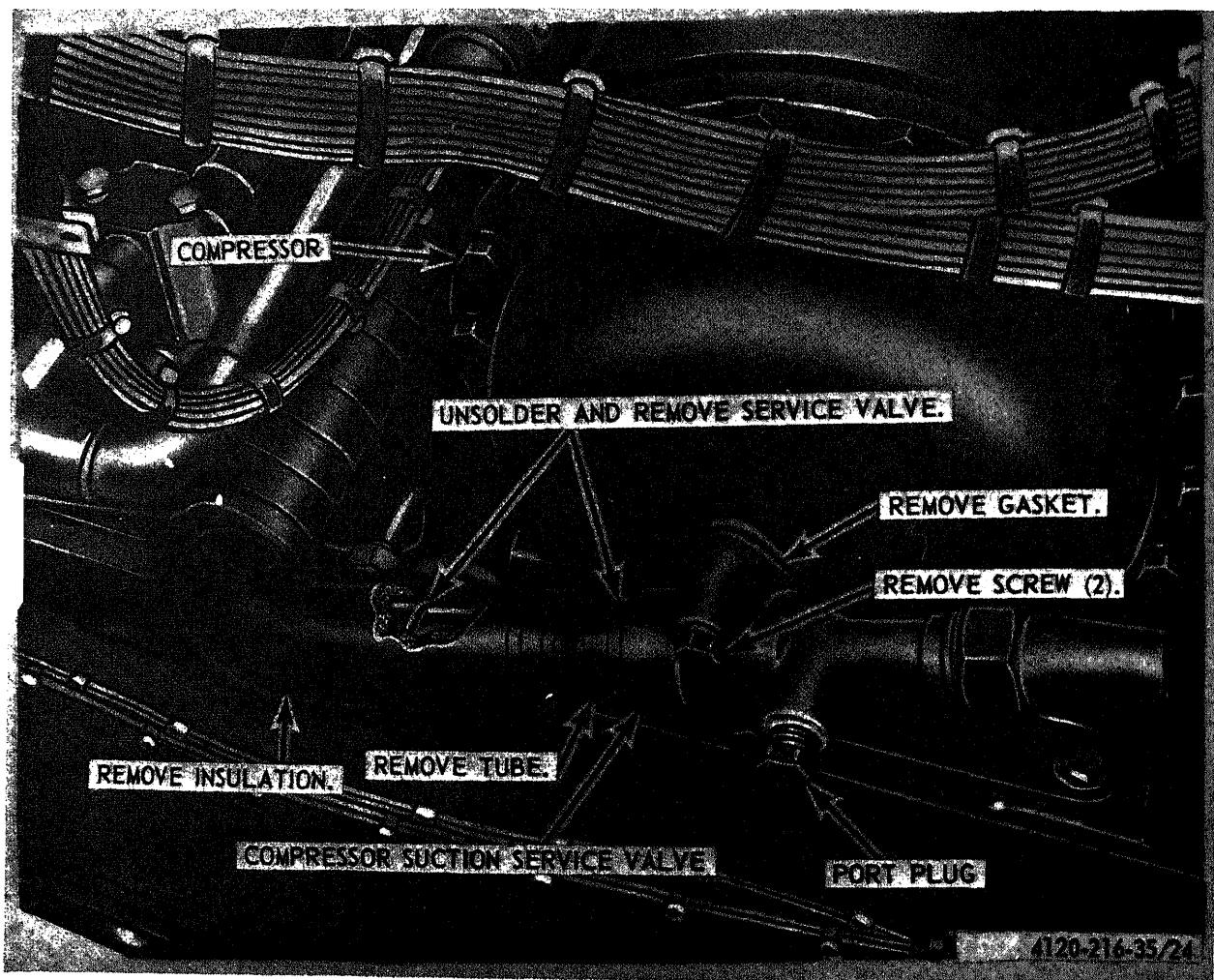


Figure 6-17. Compressor suction service valve and tube, removal and installation.

#### **6-34. Compressor Suction Service Valve and Tube Cleaning, Inspection and Repair**

*a. Cleaning.* Clean all parts with an approved cleaning solvent and dry thoroughly.

*b. Inspection.* Inspect valve and tube for cracks, nicks, breaks, and other unserviceable conditions.

*c. Repair.* Replace damaged parts.

#### **6-35. Compressor Suction Service Valve and Tube Installation**

*a. Install tube and suction service valve in reverse of instructions on figure 6-17.*

*Note.* Use only approved solder to install tube or valve on refrigeration system.

*b. Purge refrigeration system (para 6-5).*

*c. Test refrigeration system for leaks (para 6-2).*

*d. Install left side panel on frame assembly (fig. 3-9).*

### **Section IX. COMPRESSOR DISCHARGE SERVICE VALVE AND TUBE**

#### **6-36. General**

The compressor discharge service valve and tube is the hot gas outlet into the refrigeration system after refrigerant has been compressed. This valve must be opened for operation but closed when the unit is in storage. The design of the manually operated discharge service valve includes a port plug for charging, discharging, and purging of the refrigeration system. Be sure that valve is fully opened before operating air conditioner.

#### **6-37. Compressor Discharge Service Valve and Tube Removal**

*a. Remove lower front panel from the frame assembly (fig. 3-9).*

*b. Pump down refrigerant (para 6-3).*

*c. Disconnect remote control and power supply cables from air conditioner (fig. 1-2).*

*d. Loosen service plug to relieve pressure in high side of system.*

*e. Remove discharge service valve and tube as instructed on figure 6-18.*

*Caution:* Wrap the tubing with a suitable

material near area that is being unsoldered and soak wrapping with water to avoid overheating.

#### **6-38. Compressor Discharge Service Valve and Tube Cleaning, Inspection and Repair**

*a. Cleaning.* Clean all parts with an approved solvent and dry thoroughly.

*b. Inspection.* Inspect valve and tube for unserviceable condition.

*c. Repair.* Replace damaged parts.

#### **6-39. Compressor Discharge Service Valve and Tube Installation**

*a. Install tube and discharge service valve in reverse of instructions on figure 6-18.*

*b. Connect remote control and power supply cables on air conditioner (fig. 2-1).*

*c. Purge refrigeration system (para 6-5).*

*d. Test refrigeration system for leaks (para 6-2).*

*e. Change system with refrigerant as necessary (para 6-6).*

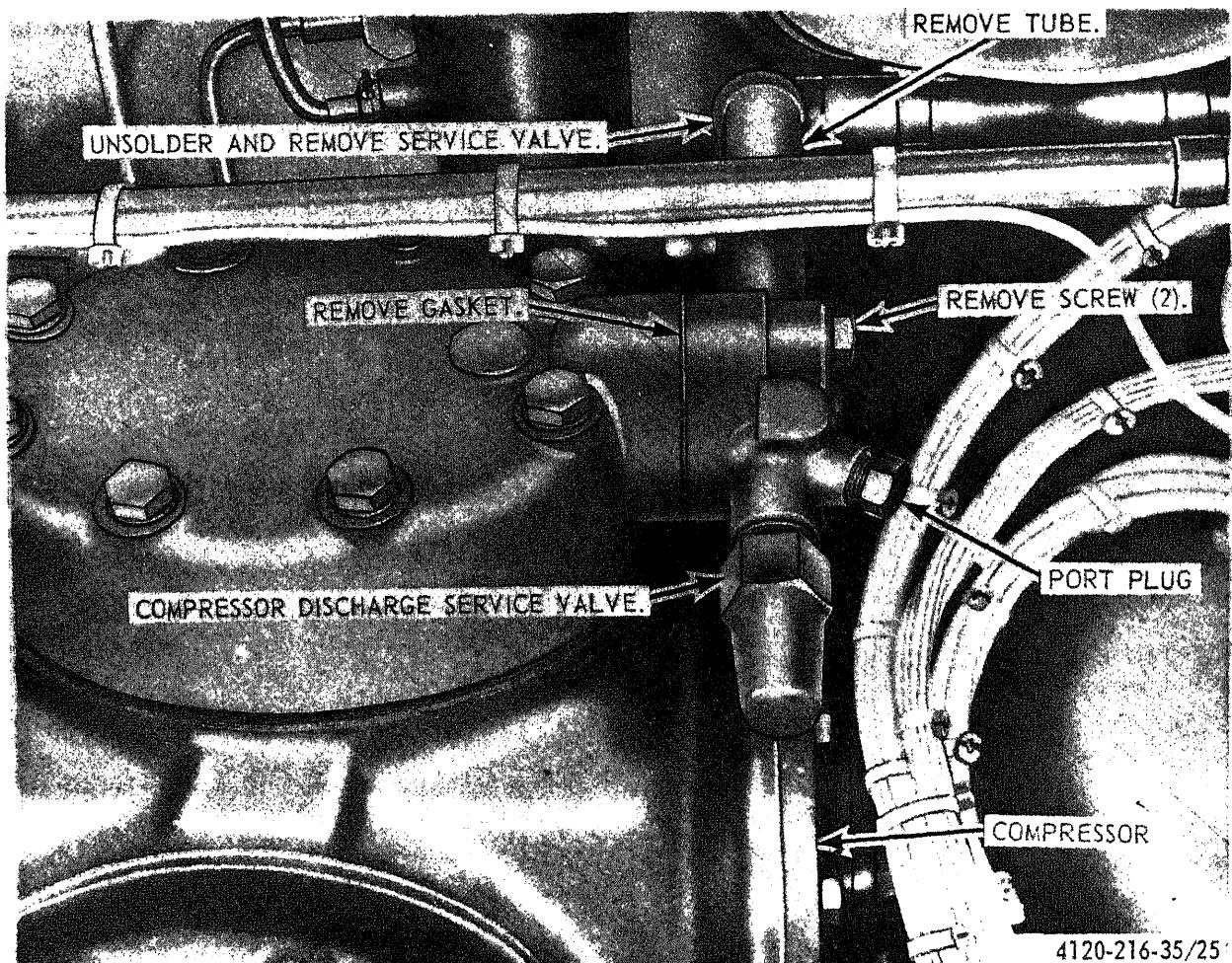


Figure 6-18. Compressor discharge service valve and tube, removal and installation.

## Section X. COMPRESSOR

### 6-40. General

The compressor assembly is a hermetically sealed, six-cylinder, piston-type refrigerant pump. The pistons are driven by a steel eccentric shaft. Positive lubrication is provided to all internal parts by a rotor type oil pump in the compressor body. Oil added with refrigerant lubricates compressor valves. A six-horsepower electric motor in the housing drives the compressor and operates on either 208 or 416 volts.

### 6-41. Compressor Removal and Disassembly

- a. *Removal.* Remove compressor (para 5-11).
- b. *Disassembly.*

- (1) Disassemble compressor as instructed on figure 6-19.
- (2) Disassemble compressor only to the extent necessary to reach and replace the defective part.

*Caution:* Prior to touching or otherwise handling any interior machined compressor parts, thoroughly coat hands with compressor oil to neutralize acids contained on skin. Always leave hands coated with oil when working with or handling compressor parts.

### 6-42. Compressor Cleaning, Inspection, and Repair

- a. *Cleaning.* Clean all parts with a cloth

dampened with an approved solvent and dry thoroughly.

*b. Inspection.* Inspect all parts of compressor and motor for wear, pitting, nicks, and other damage.

*c. Repair.* Replace all unserviceable parts.

#### **6-43. Compressor Reassembly and Installation**

*a. Reassembly.*

(1) Coat hands with compressor oil before reassembly.

(2) Reassemble the compressor as instructed on figure 6-19.

(3) Use all new gaskets. Soak gaskets in compressor lubricating oil before placing gaskets on compressor.

*b. Installation.* Install compressor (para 5-11).

### **Section XI. CHARGING AND PURGING VALVE AND TUBE**

#### **6-44. General**

The charging and purging valve for the refrigeration system is manually operated and located in the liquid line, on lower rear half of frame assembly, between the receiver diaphragm stop valve and the filter drier. The valve is used to add refrigerant to refrigeration system. Detailed instructions for adding a charge to the system are contained in paragraph 6-6.

#### **6-45. Charging and Purging Valve and Tube Removal**

*a.* Remove condenser screen assembly from the frame assembly (fig. 3-13).

*b.* Pump down refrigerant (para 6-3).

*c.* Remove charging and purging valve and tube as instructed on figure 6-20.

*Note.* Cap lines when a valve or tube section is removed. Keep foreign matter out of refrigeration system.

#### **6-46. Charging and Purging Valve and Tube Cleaning, Inspection, and Repair**

*a. Cleaning.* Clean all parts with an approved solvent and dry thoroughly.

*b. Inspection.* Inspect valve, tube and fittings for dents, pits, breaks, cracks, and other damage.

*c. Repair.* Replace all unserviceable parts.

#### **6-47. Charging and Purging Valve and Tube Installation**

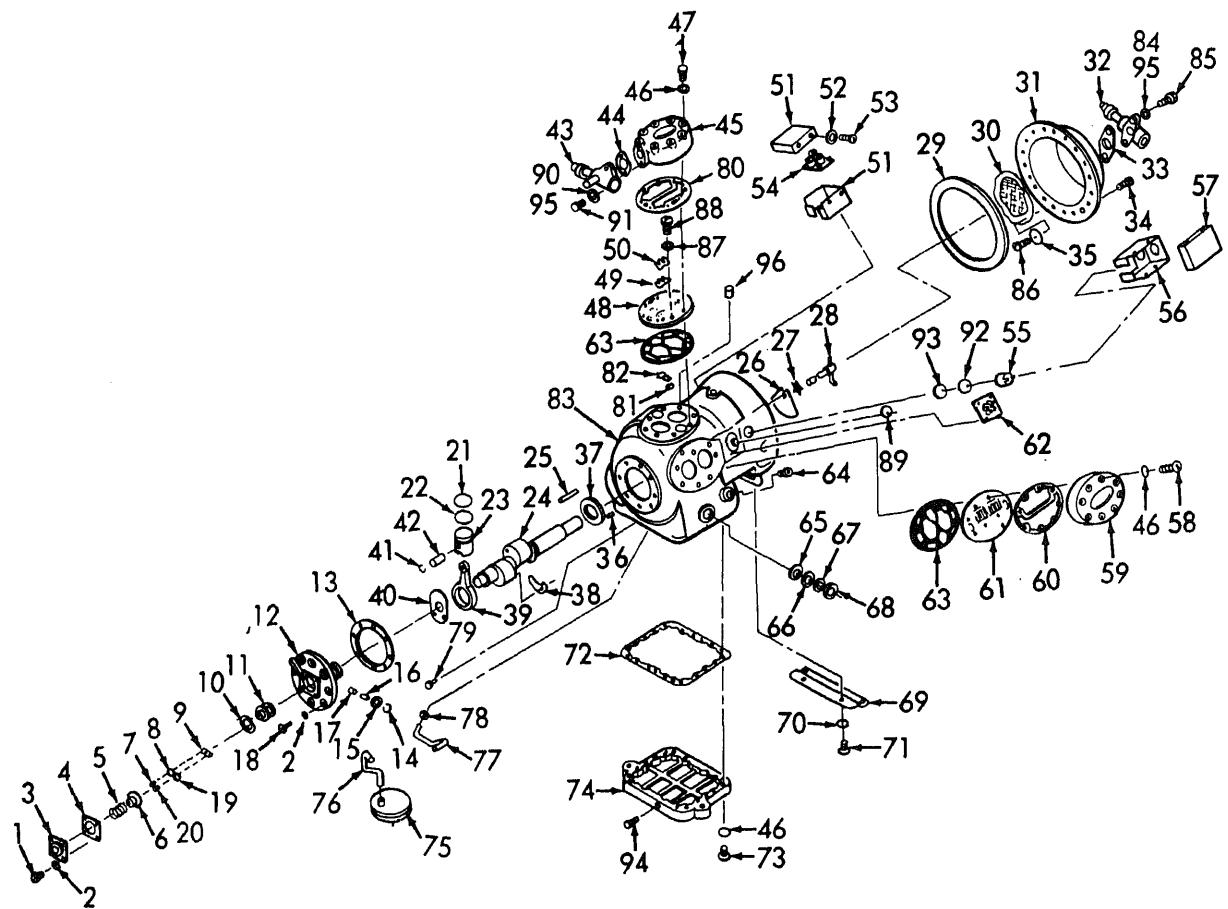
*a.* Install tube and charging and purging valve in the reverse of instructions on figure 6-20.

*b.* Purge refrigeration system (para 6-5).

*c.* Test refrigeration system for leaks (para 6-2).

*d.* Install condenser screen assembly on the frame assembly (fig. 3-13).

*e.* Start unit and add refrigerant as necessary.

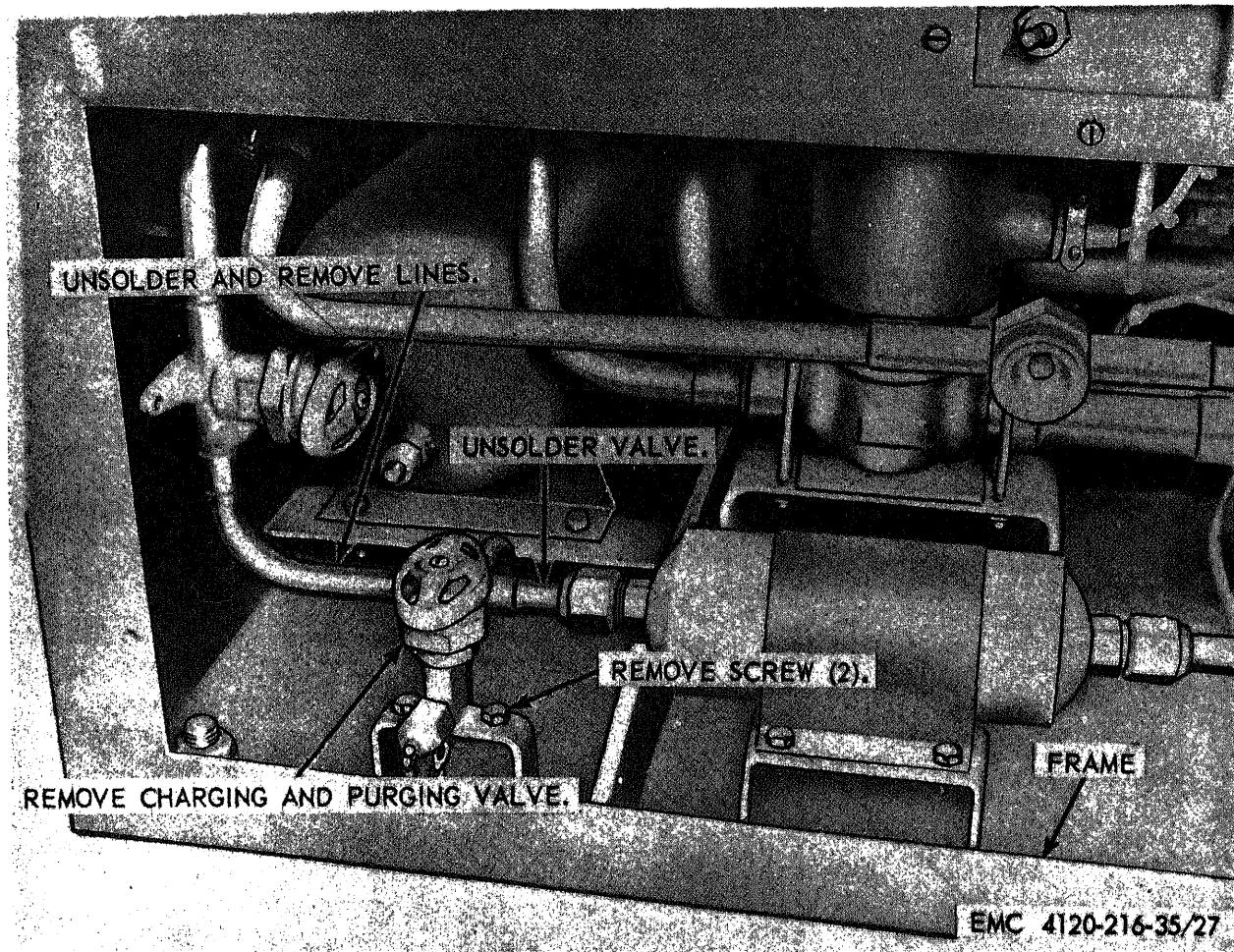


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Figure 6-19. Compressor-oil pump, piston, connecting rod, crankshaft, valves, oil filter, and cylinder head, disassembly and reassembly view.

|    |  |    |  |    |  |
|----|--|----|--|----|--|
| 1  | Bolt 5/16"-18 x $\frac{3}{4}$ (4)              | 34 | Screw, 7/16"-14 x 1 $\frac{1}{4}$ (18)                 | 66 | Window, observation                            |
| 2  | Gasket (8)                                     | 35 | Gasket (18)  | 67 | Gasket, oil level                              |
| 3  | Plate, pump end cover                          | 36 | Pin, spiral  | 68 | Gland, observation                             |
| 4  | Gasket, pump end cover                         | 37 | Washer, thrust   | 69 | Base, motor compressor                         |
| 5  | Spring, oil guide retainer                     | 38 | Shield, side-strap (3)                                 | 70 | Washer, lock (4)                               |
| 6  | Guide, oil feed                                | 39 | Strap (6)  | 71 | Screw, $\frac{3}{8}$ "-16 x 1" (4)             |
| 7  | Capscrew 10-32 x $\frac{1}{4}$ (1)             | 40 | Counterweight  | 72 | Gasket, bottom plate                           |
| 8  | Washer, lock                                   | 41 | Ring, retaining (12)                                   | 73 | Screw, $\frac{3}{8}$ "-16 x 2" (22)            |
| 9  | Drive, segment                                 | 42 | Pin, piston (6)  | 74 | Bottom plate                                   |
| 10 | Ring, retaining                                | 43 | Valve, discharge                                       | 75 | Screen, filter oil                             |
| 11 | Rotor, pump                                    | 44 | Gasket   | 76 | Tube, oil suction                              |
| 12 | Bearing head W/BRG                             | 45 | Cylinder head  | 77 | Valve, oil relief                              |
| 13 | Gasket, bearing Hd.                            | 46 | Spacer, sleeve (46)                                    | 78 | Nut, compression (1)                           |
| 14 | Retaining ring, plunger (2)                    | 47 | Screw, cap, $\frac{3}{8}$ "-16 x 3" (8)                | 79 | Valve, relief                                  |
| 15 | Guide, plunger spring (2)                      | 48 | Plate assembly   | 80 | Gasket, cylinder head (2)                      |
| 16 | Spring, plunger (2)                            | 49 | Valve, discharge (6)                                   | 81 | Spring, leaf (6)                               |
| 17 | Pump plunger (2)                               | 50 | Stop, discharge valve (6)                              | 82 | Valve, suction (6)                             |
| 18 | Capscrew $\frac{3}{8}$ "-16 x 1", (8)          | 51 | Cover assembly   | 83 | Compressor                                     |
| 19 | Washer, lock (1)                               | 52 | Washer   | 84 | Washer   |
| 20 | Capscrew, $\frac{1}{4}$ "-28 x $\frac{3}{8}$ " | 53 | Screw  | 85 | Bolt   |
| 21 | Ring, piston (12)                              | 54 | Terminal   | 86 | Screw  |
| 22 | Oil ring                                       | 55 | Thermostat   | 87 | Washer   |
| 23 | Piston assembly (6)                            | 56 | Bracket, thermostat                                    | 88 | Screw  |
| 24 | Crankshaft                                     | 57 | Cover assembly, terminal                               | 89 | Grommet, rubber                                |
| 25 | Key, machine                                   | 58 | Screw, cap $\frac{3}{8}$ "-16 x 2 $\frac{1}{2}$ " (16) | 90 | Washer   |
| 26 | Counterweight                                  | 59 | Cylinder head (2)                                      | 91 | Screw  |
| 27 | Washer, lock                                   | 60 | Gasket, cylinder head (3)                              | 92 | Washer, spring                                 |
| 28 | Screw assembly, rotor                          | 61 | Plate assembly (2)                                     | 93 | Thermostat disc                                |
| 29 | Gasket   | 62 | Terminal mounting package                              | 94 | Drain plug                                     |
| 30 | Strainer assembly                              | 63 | Gasket, valve plate (8)                                | 95 | Gasket: suction and discharge<br>valves screws |
| 31 | Cover  | 64 | Plug, oil bypass                                       | 96 | Dowel, valve plate (12)                        |
| 32 | Valve, suction                                 | 65 | Gasket, oil level site                                 |    |  |
| 33 | Gasket   |    |  |    |  |

Figure 6-19.—Continued.



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Figure 6-20. Charging and purging valve.

## Section XII. REFRIGERANT FILTER DRIER

### 6-48. General

The refrigerant filter drier is located in lower section of frame assembly at the back of the air conditioner. The filter drier contains a drying agent which filters out foreign matter and removes acid from refrigerant. A clogged filter drier is indicated when liquid outlet line is cooler than liquid inlet line. Always replace filter drier when clogged.

### 6-49. Refrigerant Filter Drier Removal

- Remove condenser screen assembly from frame assembly (fig. 3-13).
- Pump down refrigerant (para 6-3).
- Remove refrigerant filter drier as instructed on figure 6-21.

*Note.* Cap line openings when removing a component to prevent foreign material from entering the system.

### 6-50. Refrigerant Filter Drier Cleaning, Inspection, and Repair

*a. Cleaning.* Clean all parts with an approved cleaning solvent and dry thoroughly.

*Caution:* Never allow solvent or dirt to enter drier.

*b. Inspection.* Inspect filter drier, tubing, and fittings for cracks, breaks, dents, pitting, and other damage.

*c. Repair.* Replace all unserviceable parts.

*Note.* Always replace filter drier when the refrigeration system has been entered.

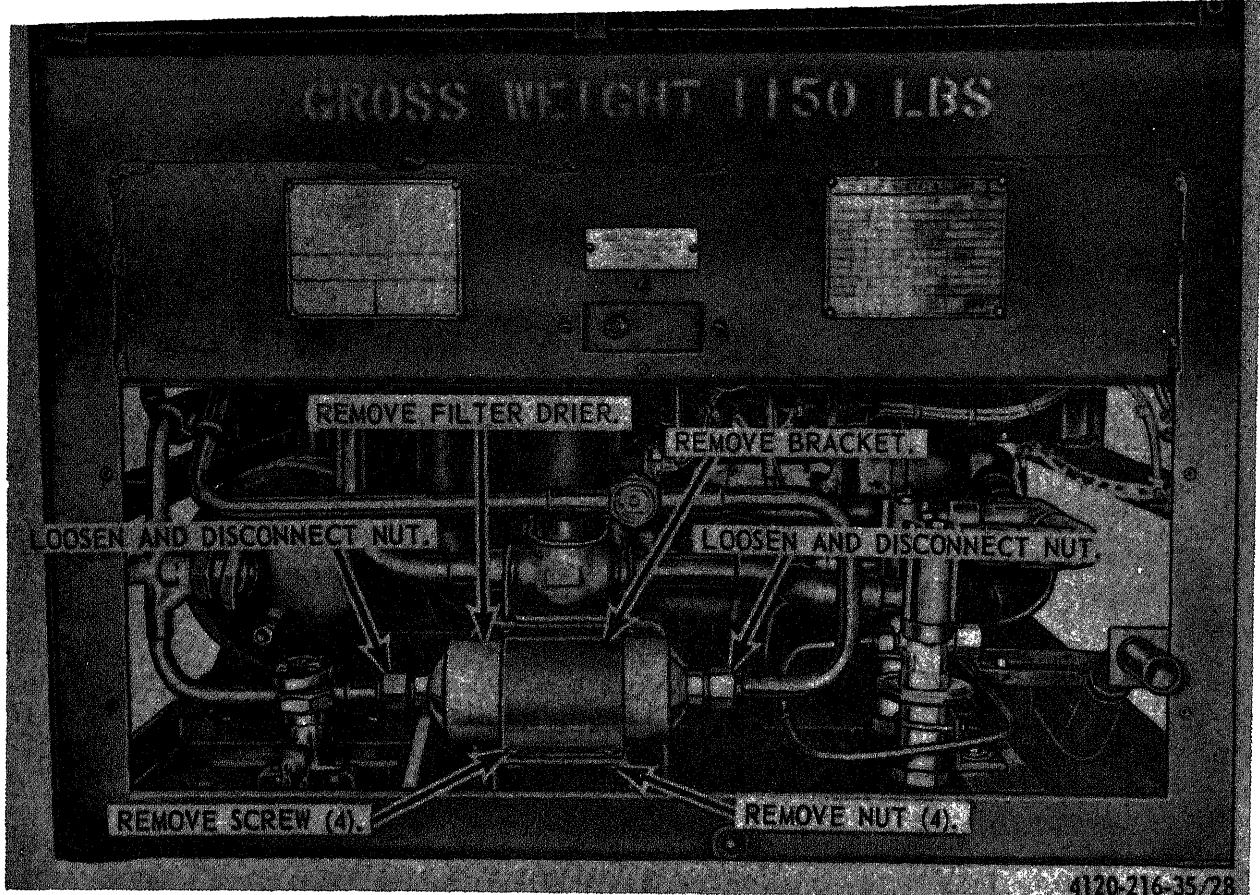


Figure 6-21. Refrigerant filter drier, removal and installation.

### 6-51. Refrigerant Filter Drier Installation

- Install refrigerant filter drier in reverse of instructions illustrated on figure 6-21.
- Purge refrigerant system (para 6-5).

- Test refrigeration system for leaks (para 6-2).
- Install condenser screen assembly on frame assembly (fig. 3-13).
- Start unit and add refrigerant as necessary (para 6-6).

## Section XIII. MOISTURE INDICATOR AND TUBES

### 6-52. General

The moisture indicator is in the liquid line that connects the filter drier and the quenching solenoid valve in lower section of frame assembly at the rear of unit. The function of the moisture indicator in the refrigeration system is described in figure 2-2c.

### 6-53. Moisture Indicator and Tubes Removal

- Remove condenser screen assembly from frame assembly (fig. 3-13).

- Pump down refrigerant (para 6-3).
- Remove moisture indicator, tubes, and fittings as instructed on figure 6-22.

### 6-54. Moisture Indicator and Tubes Cleaning, Inspection and Repair

- Cleaning.** Clean all parts with an approved cleaning solvent and dry thoroughly.
- Inspection.** Inspect moisture indicator, tubing, and connecting fittings for dents, cracks, pits, breaks, and other damage.
- Repair.** Replace all unserviceable parts.

## 6-55. Moisture Indicator and Tubes Installation

a. Install fittings, tubes, and moisture indicator in reverse of the instructions on figure 6-22.

b. Purge refrigeration system (para 6-5).

c. Test the refrigeration system for leaks (para 6-2).

d. Install condenser screen assembly on frame assembly (fig. 3-13).

e. Start unit and add refrigerant as necessary (para 6-6).

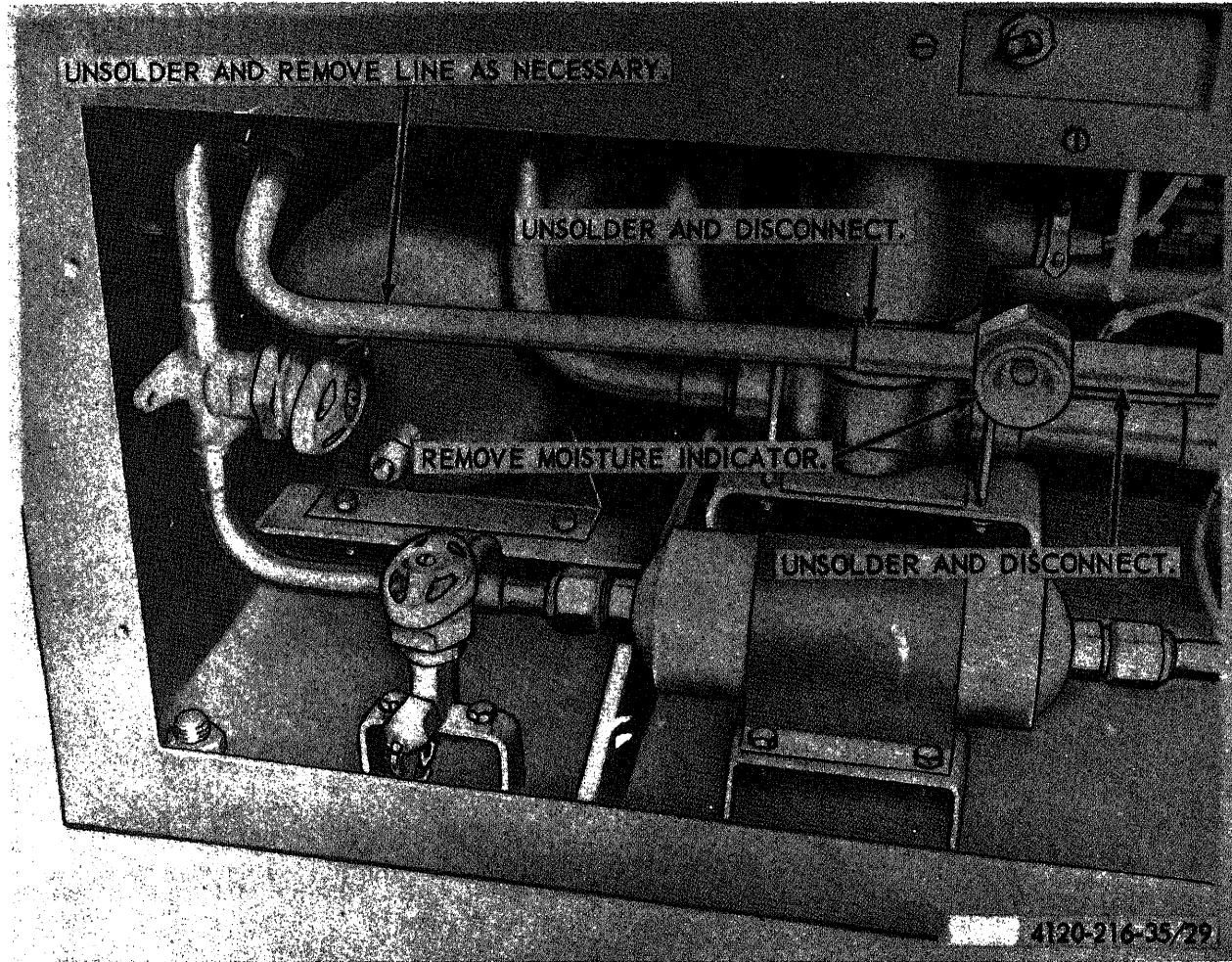


Figure 6-22. Liquid and moisture indicator and tubes, removal and installation.

## Section XIV. QUENCHING LINE SOLENOID VALVE AND WIRING

### 6-56. General

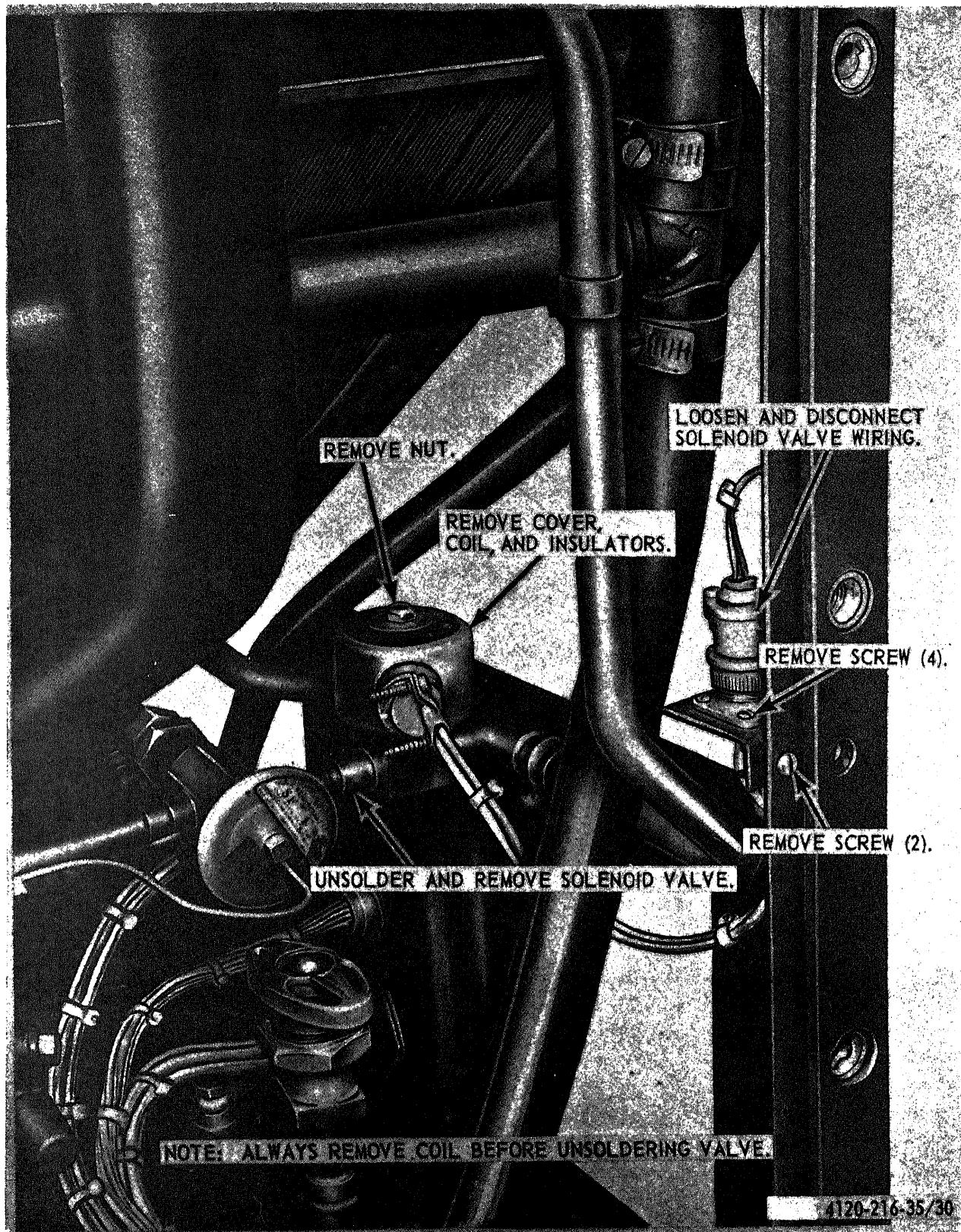
The quenching line solenoid valve is located in the front lower section of frame assembly above the receiver. It is installed between the quenching temperature expansion valve and moisture indicator. Malfunction of this valve may result from a burned out solenoid coil, or failure of the coils to actuate valve, due to wear or other damage.

### 6-57. Quenching Line Solenoid Valve and Wiring Removal and Disassembly

#### a. Removal.

- (1) Pump down refrigerant (para 6-3).
- (2) Remove quenching line solenoid valve and wiring as instructed on figure 6-23.

#### b. Disassembly. Disassemble quenching line



solenoid valve in numerical sequence as illustrated on figure 6-24.

### 6-58. Quenching Line Solenoid Valve and Wiring Cleaning, Inspection and Repair

*a. Cleaning.* Clean all parts with a cloth dampened with an approved solvent and dry thoroughly.

*b. Inspection.* Inspect valve, tubing, and mating fittings for dents, cracks, pits, deterioration, and other damage. Check coil for continuity using a multimeter.

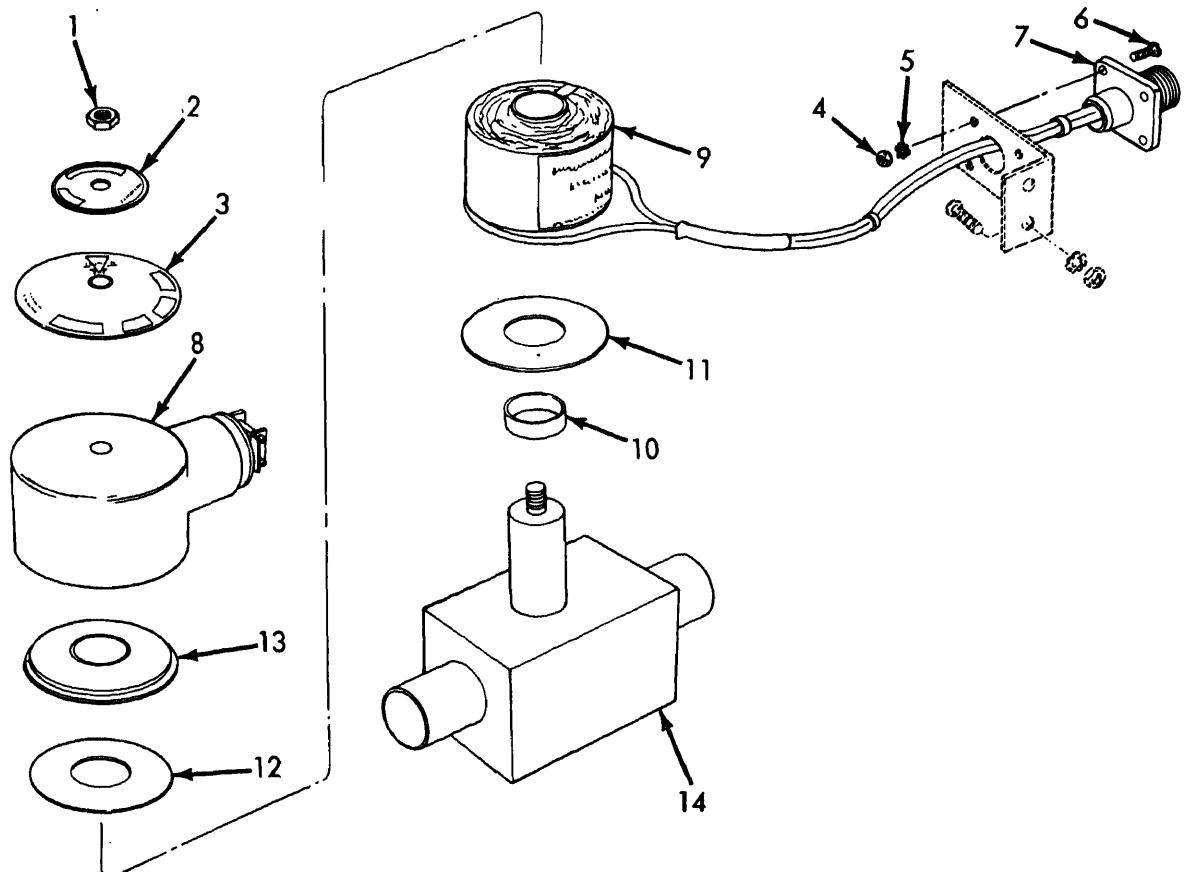
*c. Repair.* Replace all unserviceable parts.

### 6-59. Quenching Line Solenoid Valve and Wiring, Reassembly and Installation

*a. Reassembly.* Reassemble quenching line solenoid valve in reverse of numerical order illustrated on figure 6-24.

#### *b. Installation.*

- (1) Install quenching line solenoid valve and wiring in reverse of instructions on figure 6-23.
- (2) Purge refrigeration system (para 6-5).
- (3) Recharge refrigeration system (para 6-6).



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|   |                             |    |  |    |            |
|---|-----------------------------|----|--|----|------------|
| 1 | Nut, special                | 6  | Screw, slotted, 4-40 x $\frac{1}{8}$ in. | 11 | Insulator  |
| 2 | Identification plate, small | 7  | Receptacle                               | 12 | Insulator  |
| 3 | Identification plate, large | 8  | Solenoid coil cover                      | 13 | Spacer     |
| 4 | Nut, 4-40 thd. size         | 9  | Solenoid coil                            | 14 | Valve body |
| 5 | Washer, lock, No. 4         | 10 | Bushing                                  |    |            |

Figure 6-24. Quenching line solenoid valve and wiring, disassembly and reassembly, exploded view.

NOTE: DISCONNECT BULB FROM THE SUCTION LINE AND REMOVE VALVE AND BULB  
TOGETHER.

UNSOGLER AND DISCONNECT LINES.

REMOVE QUENCHING EXPANSION VALVE AND BULB

TUBE

REMOVE ALL CLIPS

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Figure 6-25. Quenching thermostatic expansion valve, bulb, and tubes, removal and installation.

NOTE: AFTER REMOVING COVER REMOVE TWO SCREWS AND REMOVE TRANSMITTER.

NOTE: TAG AND DISCONNECT ELECTRICAL LEADS AS NECESSARY.

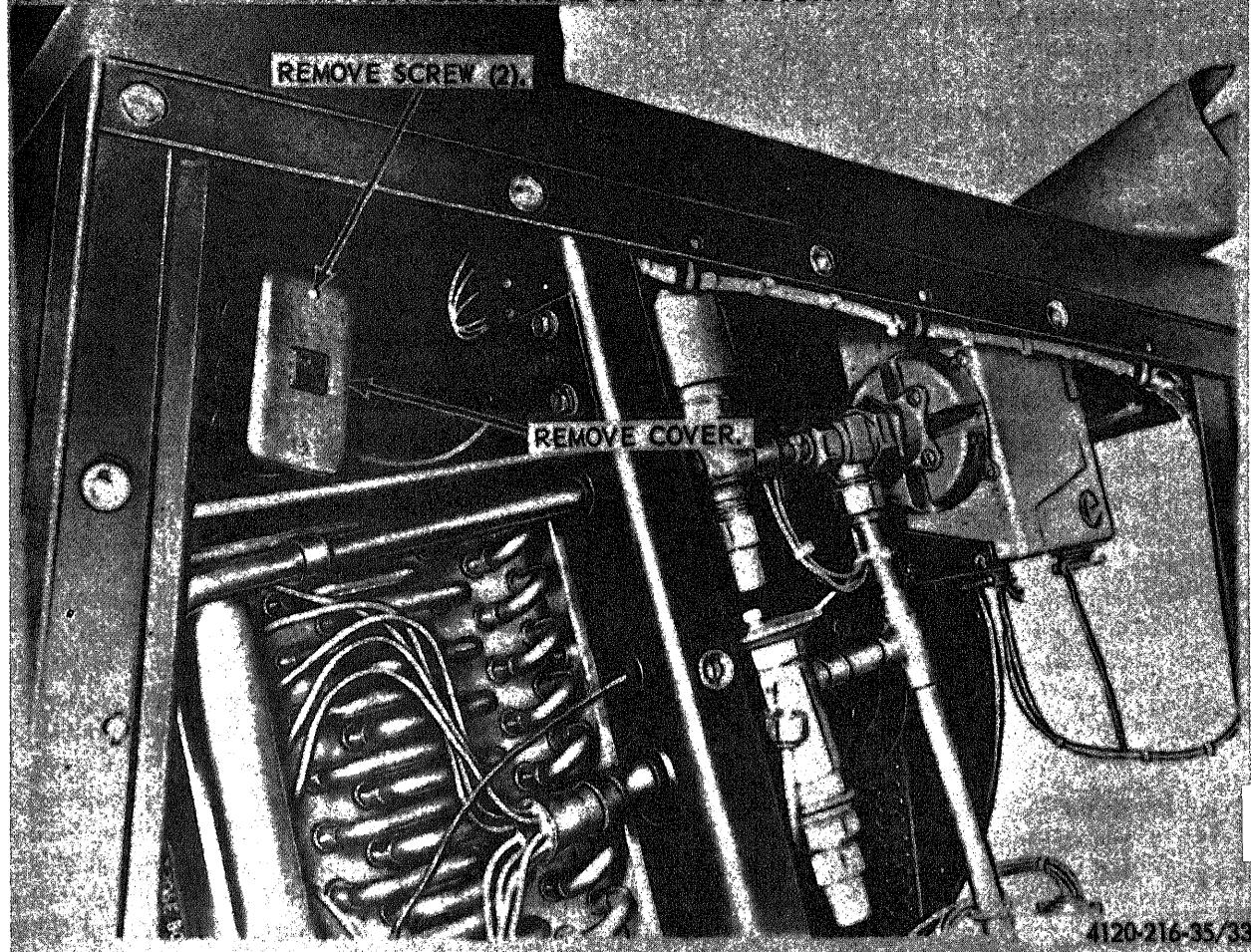


Figure 6-26. Temperature transmitter, removal and installation.

## Section XVII. ELECTRONIC ANGLE VALVE

### 6-68. General

The electronic angle valve meters the liquid refrigerant to the thermostatic expansion valves. This valve is controlled by the setpoint adjuster which is located on the rear of the remote control panel, and by the resistance thermometer sensing element. If replacement of the valve is necessary use care in setting calibration adjustment. Proper performance of air conditioner depends on efficient functioning of this valve.

### 6-69. Electronic Angle Valve Adjustment

#### a. Replacing Valve Operator (fig. 6-27).

- (1) Disconnect the power.
- (2) Remove wire leads.
- (3) Remove red tipped indicator (fig. 6-27A) by pulling forward, thus disengaging operator shaft from valve stem.
- (4) Remove 4 screws and lockwashers holding operator to bracket on frame.
- (5) Remove 4 screws holding operator to valve (fig. 6-27A) and remove operator assembly from valve.

b. *Adjustment.* If it has been necessary to replace the electronic control valve operator, adjustment may be necessary. Proceed as fol-

## Section XV. QUENCHING THERMOSTATIC EXPANSION VALVE, BULB AND TUBES

### 6-60. General

The thermostatic expansion valve is located between quenching solenoid valve and the compressor suction line. This valve meters refrigerant into evaporator coil. High pressure liquid refrigerant enters the valve and is converted into a low pressure liquid. The expansion feeler bulb mounted to the suction line senses refrigerant temperature and causes expansion valve to vary the flow of refrigerant into the evaporator coil as the heat load varies on the air conditioner.

### 6-61. Quenching Thermostatic Expansion Valve, Bulb, and Tubes Removal

- a. Remove quenching line solenoid valve (para 6-57).
- b. Remove the quenching thermostatic expansion valve, bulb, and tubes as instructed on figure 6-25.

### 6-62. Quenching Thermostatic Expansion Valve, Bulb, and Tubes Cleaning, Inspection and Repair

- a. Clean all parts with an approved solvent and dry thoroughly.
- b. *Inspection.* Inspect valve, bulb, tube, and mating fittings for cracks, dents, pits, deterioration, and other damage.
- c. *Repair.* Replace all unserviceable parts.

### 6-63. Quenching Thermostatic Expansion Valve, Bulb, and Tubes Installation

- a. Install quenching thermostatic expansion valve, tubes, and bulb in reverse of instructions illustrated on figure 6-25.
- b. Install the quenching line solenoid valve (para 6-59).
- c. Purge and recharge system (paras 6-5 and 6-6).

## Section XVI. TEMPERATURE TRANSMITTER

### 6-64. General

The temperature transmitter is mounted in the evaporator air outlet. It is interlocked with the electronic angle valve, and along with the setpoint adjuster, it controls temperature of air that flows from air conditioner.

### 6-65. Temperature Transmitter Removal

- Disconnect power supply and remote cables from air conditioner.
- Remove filter panel assembly and the upper right side panel from the frame assembly (fig. 3-7 and 3-9).
- Remove temperature transmitter as instructed on figure 6-26.

### 6-66. Temperature Transmitter Cleaning, Inspection, and Repair

- Cleaning.* Clean all parts with a cloth dampened with an approved solvent and dry thoroughly.
- Inspection.* Inspect all parts, wiring, lugs, and hardware for damage.
- Repair.* Replace an unserviceable transmitter.

### 6-67. Temperature Transmitter Installation

- Install temperature transmitter in reverse of the instructions on figure 6-26.
- Install upper right side panel and the filter panel assembly on the frame assembly (figs. 3-7 and 3-9).
- Connect remote control and power supply cables on the air conditioner (fig. 1-2).

lows with the new valve operator installed in place.

- (1) Place unit in a location where the temperature is constant.
- (2) Disconnect electrical power cable. Leave control cable connected. (The setpoint adjuster on remote control panel must be connected.)
- (3) On valve operator (fig. 6-27B), disconnect leads  $L_1$  and  $L_2$  from unit wiring and connect to a fused 208 volt power source. Voltage variations during adjustment must be within  $\pm 1.0$  volt.
- (4) Ground shielded cable by connecting ground wire to the point where cable is attached to the BX connector on the operator. (fig. 6-27B) (This cable must be grounded only at one end.)
- (5) At the sensing element, in the supply air outlet, disconnect the shielded cable and connect it to a resistance box adjustable from 0-1500 ohms (fig. 6-27A).
- (6) Turn on 208 volt power and allow the valve operator to warm up for at least 2 hours.

c. *Check Valve Stem Travel.*

- (1) Set resistance box at 1100 ohms. Valve indicator pin, (fig. 6-27A) will move to "open" mark printed on operator.
- (2) Increase resistance (200 ohm increments) until further pin movement, if any, ceases. This insures that the valve is in full open position.
- (3) Assembly "Indicator Gage" (see fig. 6-27G for gage dimensions) shown on figure 6-27A. Be certain indicator angle is securely clamped to prevent movement. Indicator pin must line up with the right edge of gage as shown in figure 6-27C.
- (4) Reduce resistance to zero ohms. If within 2 minutes indicator pin travels to a position to the left of that shown in figure 6-27D then valve stem travel is satisfactory. Otherwise valve travel must be adjusted.

d. *Adjusting Valve Stem Travel (if required).*

- (1) Disconnect power and remove "Indicator Gage" if installed.
- (2) Remove the 4 screws that hold the Valve Operator to the bracket on the frame (fig. 6-27A).
- (3) Remove the 4 screws that hold the mounting flange to the operator (fig. 6-27A).
- (4) Hold the operator carefully to prevent the valve stem from rotating. With pliers remove the indicator pin that holds the operator to the valve stem (fig. 6-27A).
- (5) With colored pencil make a dot on the valve stem at the 9:00 o'clock position looking at the operator side of the valve body. Do not mark on threads.
- (6) Reinsert the indicator pin and loosen the locking nut with a 5/16" open end wrench.
- (7) Turn the locking nut down to the end of the threads.
- (8) Turn the coupling clockwise until pin is against the end of the valve stem.
- (9) Rotate coupling and valve stem until reference dot is back in 9:00 o'clock position. Hold valve stem and back of coupling until indicator pin is also in 9:00 o'clock position (fig. 6-27A).
- (10) Tighten the locknut. Pull the valve full open by hand. Remove the indicator pin.
- (11) Replace the Valve Operator and insert the indicator pin.
- (12) Before screws are inserted make sure there is at least 0.020 of an inch distance between the valve body mounting flange and the Operator. This distance guarantees that the stem adjustment is not such that the plunger upon being retracted by the transistor operator will damage the stem seal.
- (13) Replace the four screws on the valve bracket and the four screws on the mounting flange to hold the assembly in place.

e. *Calibrating the Throttling Range.*

- (1) Complete steps 1 through 6 under "Preparation."

- (2) Complete steps 1 through 3 under "Check Valve Stem Travel." Adjust valve stem travel if required.
- (3) Set resistance box at 1070 ohms. Turn operator calibration adjustment screw gradually counterclockwise until the indicator pin reaches position "A" as shown in figure 6-27E and remains there 1 minute. (Calibration screw turned CCW moves pin toward closed position B.)

**Warning:** Do not insert screwdriver over 1/32" in adjustment slots.

- (4) Reduce resistance by 18 ohms (to 1052).
- (5) Wait 2 minutes for indicator pin to come to a full stop. Then adjust throttling range screw to bring indicator pin to approximate position "B" (fig. 6-27E). (The throttling range screw turned CCW decreases the range and increases the sensitivity.)
- (6) Increase resistance (approximately 18 ohms) until pin stops at Position A. Record resistance setting.
- (7) Reduce resistance 18 ohms. Repeat Step 5.
- (8) Repeat Steps 5, 6, and 7 until exactly 18 ohms is required to move pin between Position A and Position B.

#### *f. Throttling Control.*

- (1) Cycling or delivery air temperature can be reduced by lowering the sensitivity (increasing the throttling range) on the Valve Operator. If undesirable cycling exists turn the throttling adjustment screw (fig. 6-27B) *very slightly* in the clockwise direction (toward increase). After each slight adjustment put unit back in service for three hours before making another adjustment.
- (2) If delivery air temperature starts out at the desired point but drifts upward over a period of several hours, the sensitivity of the throttling control can be raised by turning the throttling adjustment screw very slightly counterclockwise (toward decrease).

*Note.* Whenever the throttling range ad-

justment is changed the setpoint of the leaving air temperature also changes.

#### *g. Method of Calibrating Setpoint.*

- (1) To set the calibration adjustment of the valve, first make sure the setpoint adjuster on the back of the remote control panel is set for the leaving air temperature desired. (This is an established position, since there is no calibrated dial and pointer on the remote setpoint adjuster.) The remote setpoint adjuster has a range of 56 to 84° F. and the setpoint can be accurately estimated in the following manner using the sketch below as a guide.
- (2) Turn the remote setpoint adjuster counterclockwise to the limit position. This represents the 56° F. position. On the side of the adjuster shaft put a mark in the 7:00 o'clock position. This mark will then act as a point for assisting in establishing setpoint. The 12:00 o'clock position represents approximately 70° F. The screwdriver slit position is not the same on each remote setpoint adjuster, and therefore should not be used as a setting device.
- (3) Start the unit and allow it to run until the temperature has stabilized as measured by a thermometer in the conditioned air leaving the unit. This will determine the temperature at which the valve is now set. (If the remote setpoint is set for a very low temperature and the entering air temperature is very high, the load may be above the refrigeration capacity of the unit and the desired temperature would not be obtained.)
- (4) If the leaving air temperature is below that estimated on the remote setpoint adjuster, turn the calibration adjustment on the valve  $\frac{1}{8}$  turn counterclockwise (or  $\frac{1}{8}$  turn clockwise, if the temperature is above what was estimated on the remote setpoint adjuster). Allow sufficient time for the temperature to stabilize. Repeat this procedure until the desired temperature is obtained.

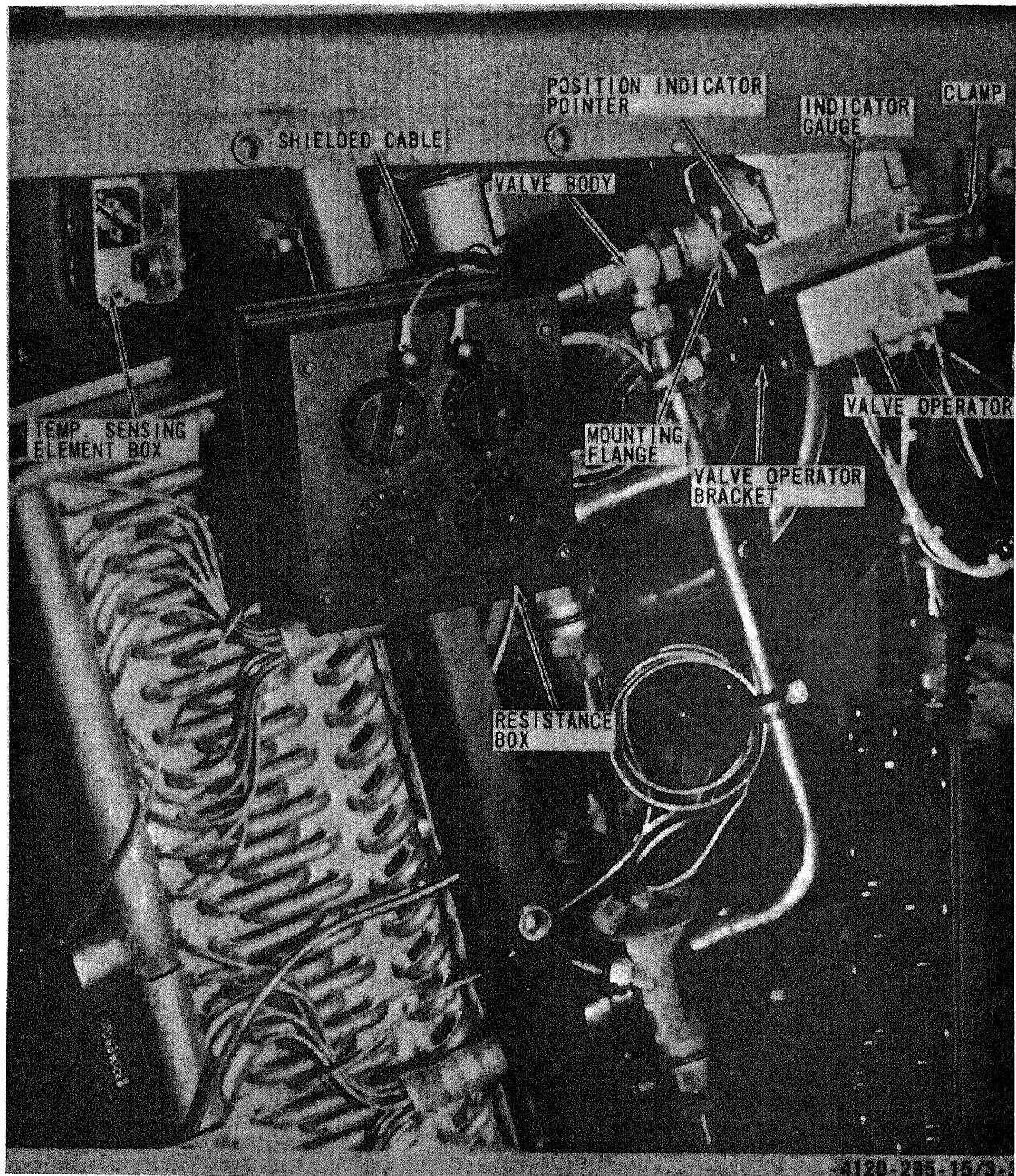
*h. Test.*

(1) Operator remains in open position regardless of control point adjustment setting.

(a) Check power supply.

(b) If there is power to the operator, but it fails to respond:

1. Turn the calibration adjustment



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Figure 6-27 ①. Electronic angle valve adjustment point.

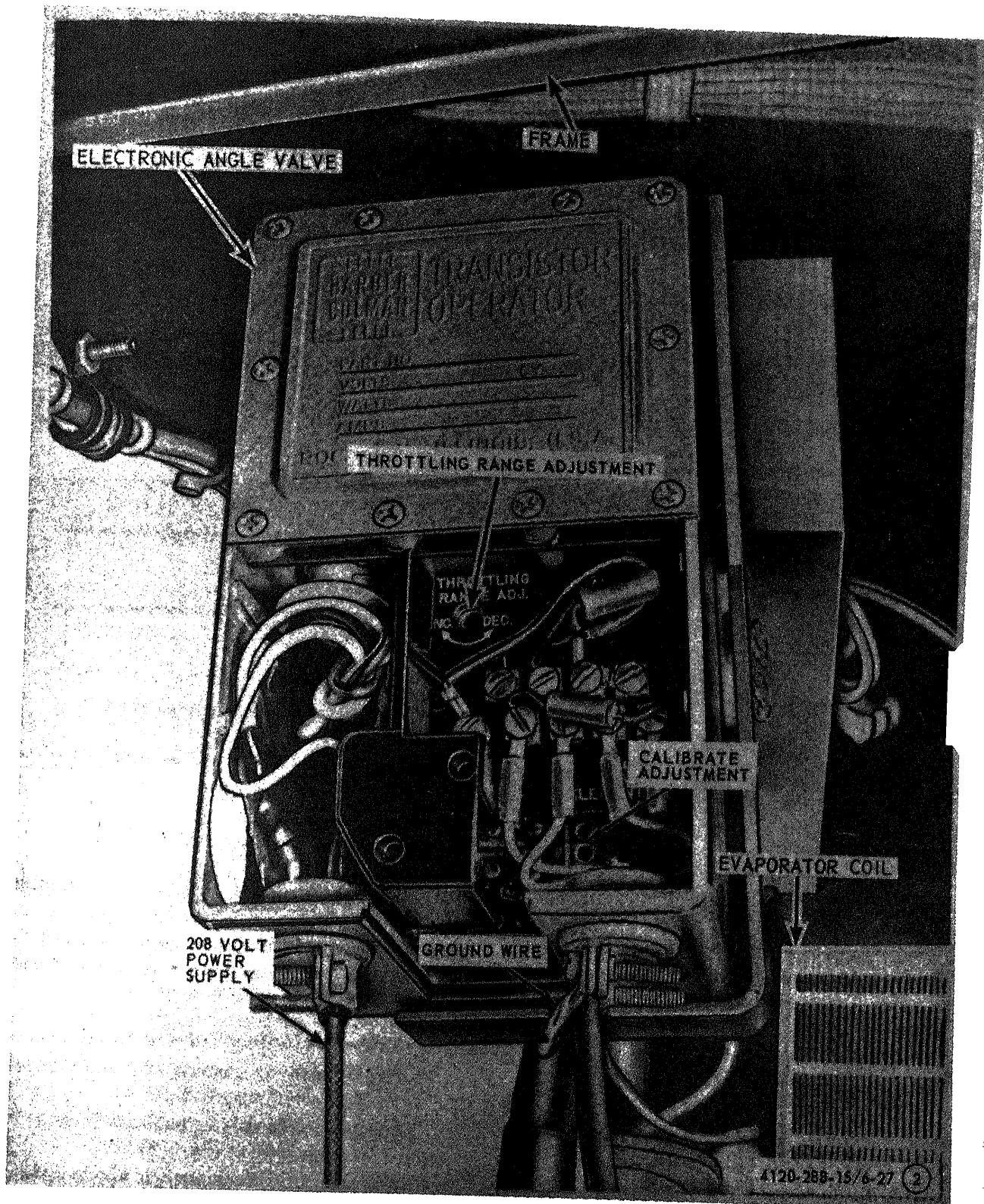


Figure 6-27 (2).—Continued.

through its range. Turn slowly enough to give the operator time to react.

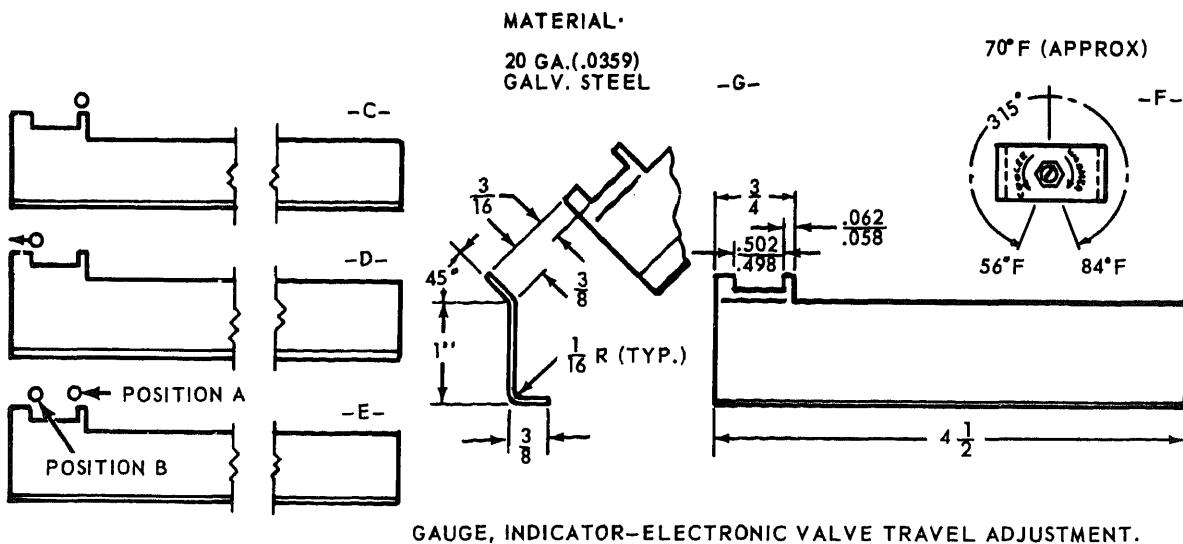
- Check for a resistance of approximately 1,000 ohms across the sensing element.

*Note.* If the resistance is less than 950 ohms, replace the element assembly.

- Rotate dial on remote setpoint adjuster to call for maximum heat.

This removes the adjustment potentiometer from the circuit. Resistance readings will then be of the discharge element only.

- Check for continuity between the receptacle connector and the operator terminals.
- If no operator movement is indicated in any of these steps, replace operator.



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Figure 6-27 ③.—Continued.

#### 6-70. Electronic Angle Valve Removal

- Pump down refrigerant (para 6-3).
- Tag and disconnect electrical leads from temperature transmitter on electronic angle valve (para 6-69).
- Remove electronic angle valve as instructed on figure 6-28.

#### 6-71. Electronic Angle Valve Cleaning, Inspection, and Repair

- Cleaning.* Clean all parts with a cloth damped with an approved solvent and dry thoroughly.
- Inspection.* Inspect valve, tubing, and fit-

tings for cracks, leaks, pitting, deterioration, and other damage.

- Repair.* Replace an unserviceable valve.

*Note.* If leak is detected around linkage, replace teflon packing rings.

#### 6-72. Electronic Angle Valve Installation

- Install electronic angle valve in reverse of instructions on figure 6-28.
- Connect temperature transmitter leads on electronic angle valve (para 6-69).
- Purge refrigeration system (para 6-5).
- Test refrigeration system for leaks (para 6-2).
- Adjust electronic angle valve (para 6-69).

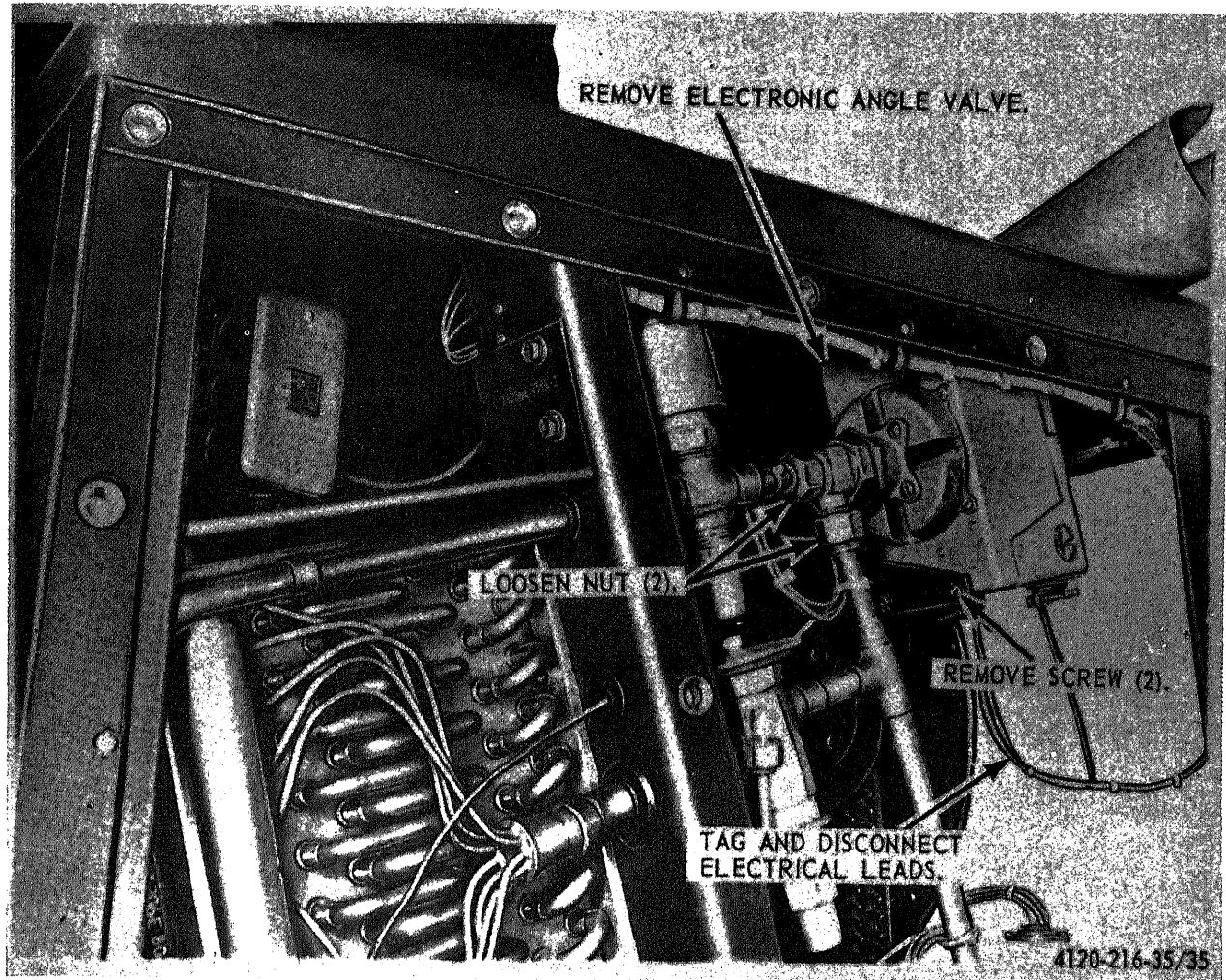


Figure 6-28. Electronic angle valve, removal and installation.

### Section XVIII. SOLENOID VALVE AND TUBES

#### 6-73. General

The solenoid valve is located behind the electronic angle valve toward the front of the frame assembly in the liquid line tube and is controlled by the manual cool switch, permitting the liquid refrigerant to pass through the electronic angle valve to the expansion valves before reaching the evaporator coil. When removing this valve from liquid line tube, remove the manual stem packing and the magnet coil as high temperature may damage valve seat.

#### 6-74. Solenoid Valve and Tubes Removal

- Remove electronic angle valve (para 6-70).
- Remove solenoid valve and tubes as in-

structed on figure 6-29.

#### 6-75. Solenoid Valve and Tubes Cleaning, Inspection, and Repair

*a. Cleaning.* Clean all parts with a cloth dampened with an approved solvent and dry thoroughly.

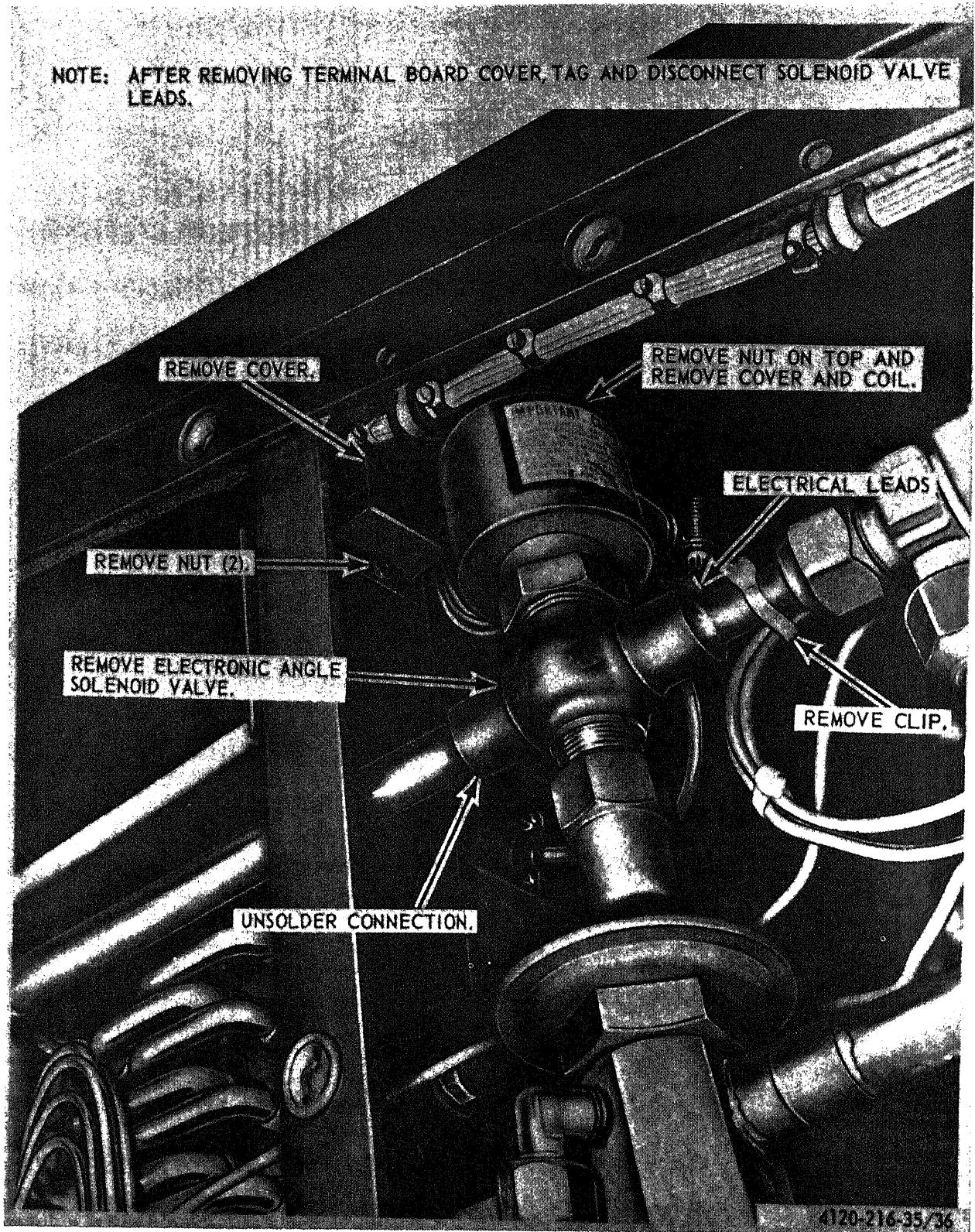
*b. Inspection.* Inspect valve, tubing, and fittings for dents, cracks, pits, deterioration, and other damage.

*c. Repair.* Replace an unserviceable valve.

#### 6-76. Solenoid Valve and Tubes Installation

- Install solenoid valve and tubes in reverse of instructions on figure 6-29.
- Install electronic angle valve (para 6-72).

NOTE: AFTER REMOVING TERMINAL BOARD COVER, TAG AND DISCONNECT SOLENOID VALVE LEADS.



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Figure 6-29. Solenoid valve and tubes, removal and installation.

## Section XIX. THERMOSTATIC EXPANSION VALVES, BULBS, AND TUBES

### 6-77. General

Two thermostatic expansion valves control flow of refrigerant into evaporator coil and act as a restriction between high and low pressure sides of the refrigerant circuit. These two valves maintain a relatively constant temperature of the refrigerant gas leaving the evaporator coil. These valves do not need adjustment except when air conditioning unit overhauled.

### 6-78. Thermostatic Expansion Valves, Bulbs, and Tubes Removal

a. Remove electronic angle valve (para 6-70).

b. Remove thermostatic expansion valves, bulbs, and tubing as instructed on figure 6-30.

### 6-79. Thermostatic Expansion Valves, Bulbs, and Tubes Cleaning, Inspection, and Repair

a. *Cleaning.* Clean all parts with approved solvent and dry thoroughly.

b. *Inspection.* Inspect valve, bulb, and tubes for dents, cracks, pits, deterioration and other damage.

c. *Repair.* Replace unserviceable valve.

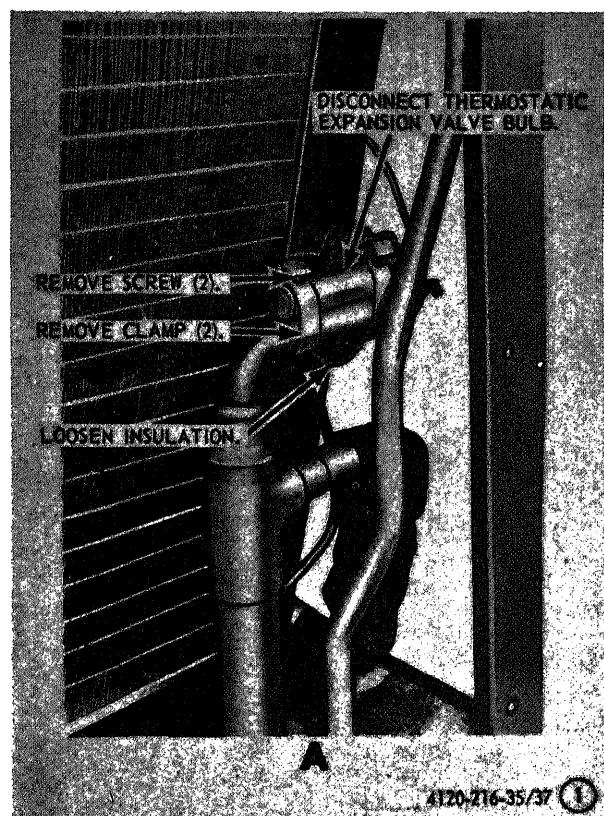
### 6-80. Thermostatic Expansion Valves, Bulbs, and Tubes Installation and Adjustment

#### a. Installation.

- (1) Install tubing, thermostatic expansion valves, and bulbs in reverse of instructions of figure 6-30.
- (2) Install electronic angle valve (para 6-72).

b. *Adjustment.* Flow of refrigerant through the expansion valves is controlled by a slotted adjustment stem under the expansion valve cap (fig. 6-30b). Increase flow of refrigerant

from expansion valve to evaporator coil to lower temperature of coil. Turn valve stem counterclockwise to increase flow of refrigerant from valve; clockwise to decrease flow and raise temperature of condenser coil. Wait approximately 30 minutes, depending upon ambient temperature, for a new balance to take place of the conditioned air from unit. Do not turn a valve adjustment more than two turns at any one time. Be sure unit is free of leaks after installing cap on expansion valve.



A. Bulb, removal.

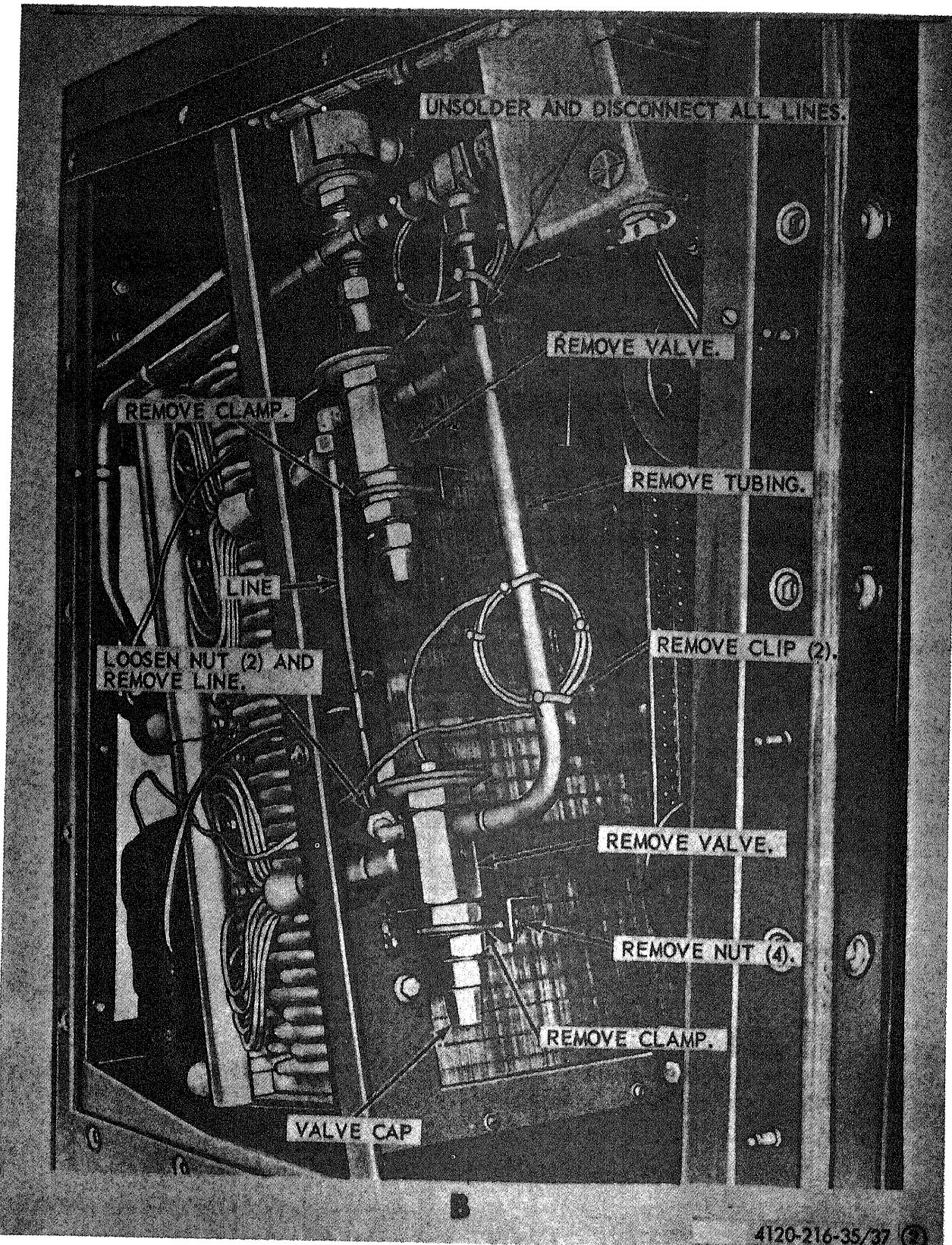
Figure 6-30 ①. Thermostatic expansion valves, bulbs and tubing, removal and installation.

## Section XX. HOT GAS BYPASS SOLENOID VALVE AND TUBES

### 6-81. General

The hot gas bypass solenoid valve is located behind the compressor and below condenser

coil. It is a protective feature in the refrigeration system for unloading the compressor. The hot gas bypass solenoid valve is normally open



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B. Valve, removal.  
Figure 6-30 ②.—Continued.

when energized but is set to close automatically when suction pressure is above 47 psi or if unit is turned off.

#### 6-82. Hot Gas Bypass Solenoid Valve and Tubes Removal

- a. Remove panels (fig. 3-9).
- b. Pump down refrigeration system (para 6-3).
- c. Remove the magnet coil.
- d. Remove hot gas bypass solenoid valve and tubes as instructed on figure 6-31.

#### 6-83. Hot Gas Bypass Solenoid Valve and Tubes, Cleaning, Inspection and Repair

- a. *Cleaning.* Clean all parts with an approved cleaning solvent.

b. *Inspection.* Inspect valve, tubing, and fittings for dents, cracks, deterioration, and other damage.

c. *Repair.* Replace unserviceable parts.

#### 6-84. Hot Gas Bypass Solenoid Valve and Tubes Installation

- a. Install tubes and hot bypass solenoid valve in reverse of instructions on figure 6-31.

**Warning:** Do not permit solder to get into tubing when installing component on the refrigeration tubing.

- b. Purge refrigeration system (para 6-5).
- c. Install panels (fig. 3-9).
- d. Test refrigeration system for leaks (para 6-3).

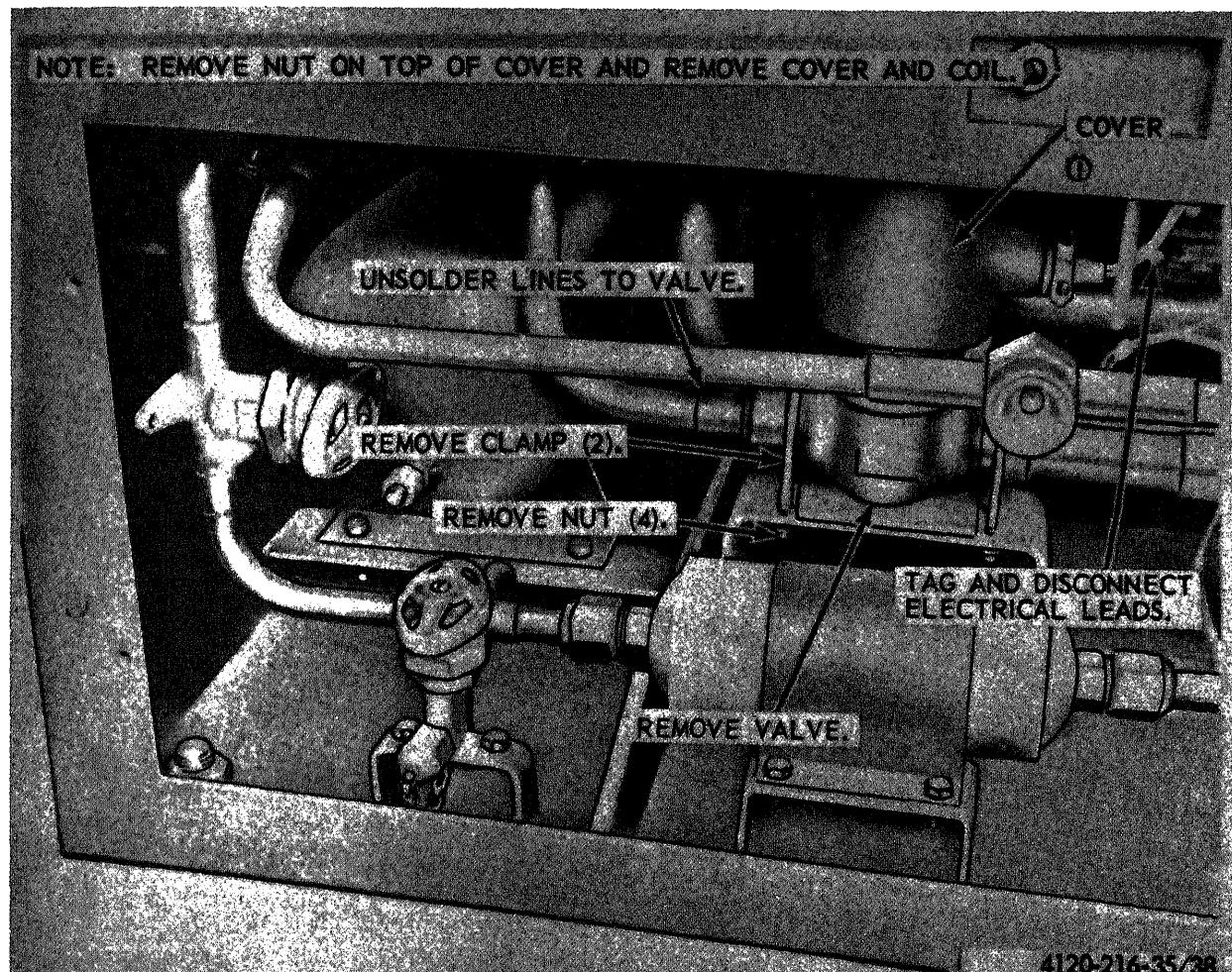


Figure 6-31. Hot gas bypass solenoid valve and tubes, removal and installation.

## Section XXI. HOT GAS BYPASS VALVES AND TUBES

### 6-85. General

The hot gas bypass valves are located in lower section of frame assembly behind the compressor. These two valves are pressure actuated. When pressure in suction line is reduced, the valves open to recirculate hot gas discharged from compressor, to reduce compressor capacity.

### 6-86. Hot Gas Bypass Valve and Tubes Removal

- Pump down refrigerant (para 6-3).
- Remove hot gas bypass valve, fittings, and tubes as instructed on figure 6-32.

*Note.* Remove only those valves, tubes, and fittings necessary to replace unserviceable components.

### 6-87. Hot Gas Bypass Valve and Tubes Cleaning, Inspection, and Repair

*a. Cleaning.* Clean all parts with an approved solvent and dry thoroughly.

*b. Inspection.* Inspect valve, tubes, and fittings for dents, cracks, pits, deterioration, and other damage.

*c. Repair.* Replace all unserviceable parts.

### 6-88. Hot Gas Bypass Valve and Tubes Installation

*a. Install* fittings, tubes, and hot gas bypass valve in reverse of instructions on figure 6-32.

*b. Purge* refrigeration system (para 6-5).

*c. Test* refrigeration system for leaks (para 6-2).

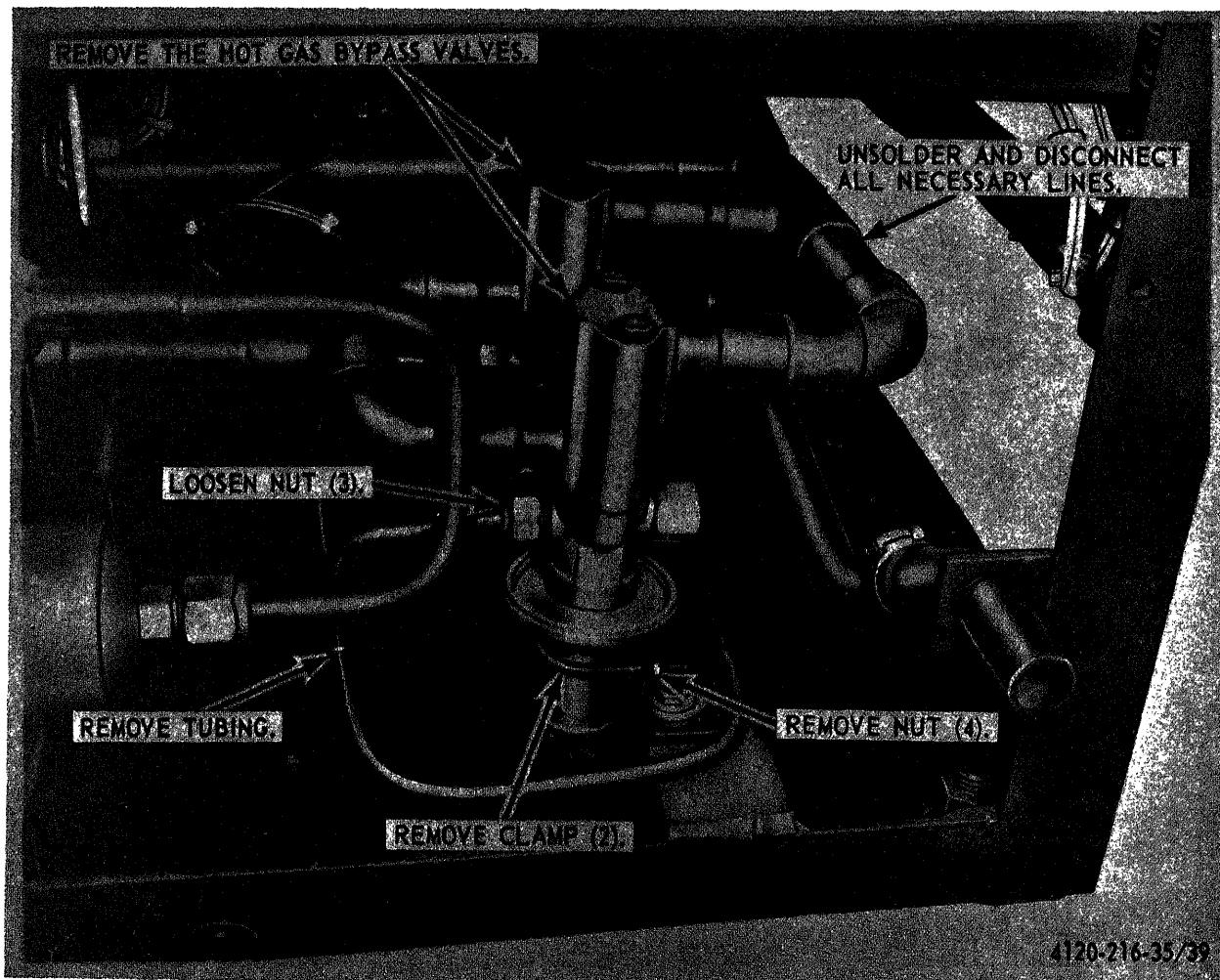


Figure 6-32. Hot gas bypass valve and tubes, removal and installation.

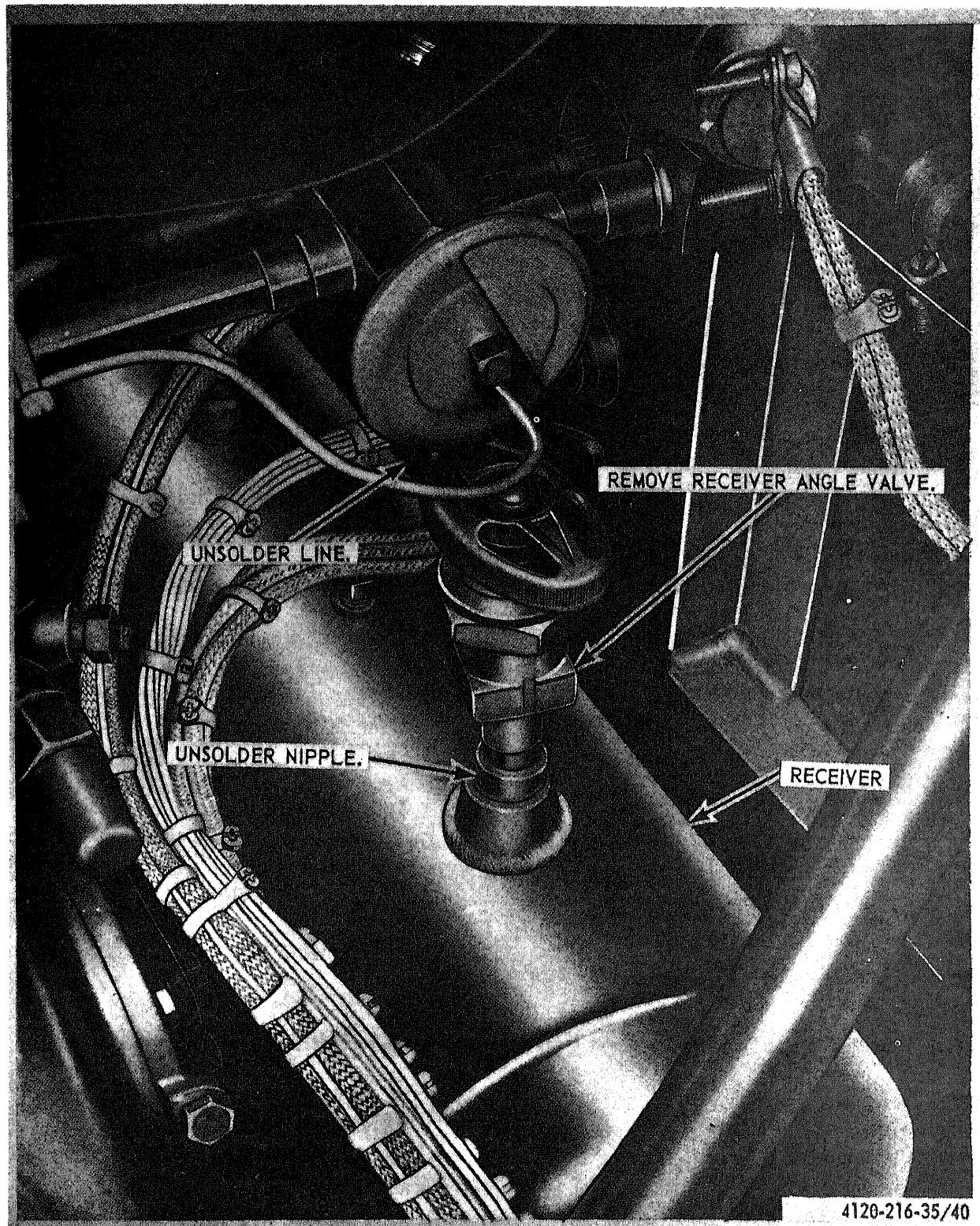


Figure 6-33. Receiver angle shutoff valve and tubes, removal and installation.

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## Section XXII. EVAPORATOR COIL AND TUBES

### 6-89. General

The evaporator coil is located on upper section of frame assembly. Within the evaporator coil the refrigerant liquid expands very rapidly at low pressure and removes heat from air that is circulated over the coils. When the liquid expands it is converted from a liquid to a low pressure gas and is sucked out of the coil by operation of the compressor.

### 6-90. Evaporator Coil and Tubes Removal

Remove evaporator coil from frame assembly as instructed in paragraph 5-12.

### 6-91. Evaporator Coil and Tubes Cleaning, Inspection, and Repair

*a. Cleaning.* Clean all parts with an approved solvent and dry thoroughly.

*b. Inspection.* Inspect coil, tubes, fittings, mounting hardware and mounting area for dents, cracks, breaks, deterioration, and other damage.

*c. Repair.*

- (1) Repair evaporator coil by straightening all bent tubes, fins, or pipes.
- (2) Solder all cracks, breaks, or leaks.

### 6-92. Evaporator Coil and Tubes Installation

Install evaporator coil on frame assembly as instructed in paragraph 5-12.

## Section XXIII. RECEIVER ANGLE SHUTOFF VALVE AND TUBES

### 6-93. General

The receiver angle shutoff valve is manually operated and is located on the liquid receiver. All liquid in system passes through this valve before it enters the liquid receiver and valve must be completely open when unit is operating.

### 6-94. Receiver Angle Shutoff Valve and Tubes Removal

*a.* Discharge refrigerant from air conditioner refrigeration system (para 6-4).

*b.* Remove receiver angle shutoff valve and tubes as instructed on figure 6-33.

### 6-95. Receiver Angle Shutoff Valve and

#### Tubes Cleaning, Inspection and Repair

*a. Cleaning.* Clean all parts with an approved solvent and dry thoroughly.

*b. Inspection.* Inspect for nicks, dents, cracks, deterioration and other damage.

*c. Repair.* Replace an unserviceable valve.

### 6-96. Receiver Angle Shutoff Valve and Tubes Installation

*a.* Install tubes and receiver angle shutoff valve in reverse of instructions on figure 6-33.

*b.* Recharge refrigeration system (para 6-6).

*c.* Test refrigeration system for leaks (para 6-2).

## Section XXIV. RECEIVER SHUTOFF DIAPHRAGM STOP VALVE AND TUBE

### 6-97. General

The receiver shutoff diaphragm stop valve is manually operated and is located in liquid line tube between the liquid receiver and the charge valve in lower section of frame assembly. The valve is always open when unit is operating; closed when pumping liquid refrigerant into the liquid receiver for either pump

### 6-98. Receiver Shutoff Diaphragm Stop Valve and Tubes Removal

*a.* Discharge refrigerant from air conditioner refrigeration system (para 6-4).

*b.* Remove shutoff diaphragm stop valve and tube as instructed on figure 6-34.

### 6-99. Receiver Shutoff Diaphragm Stop Valve and Tube Cleaning, Inspection, and Repair

a. *Cleaning.* Clean all parts with an approved solvent and dry thoroughly.

b. *Inspection.* Inspect valve and tube for cracks, breaks, dents, wear, and other damage.

c. *Repair.* Replace an unserviceable valve.

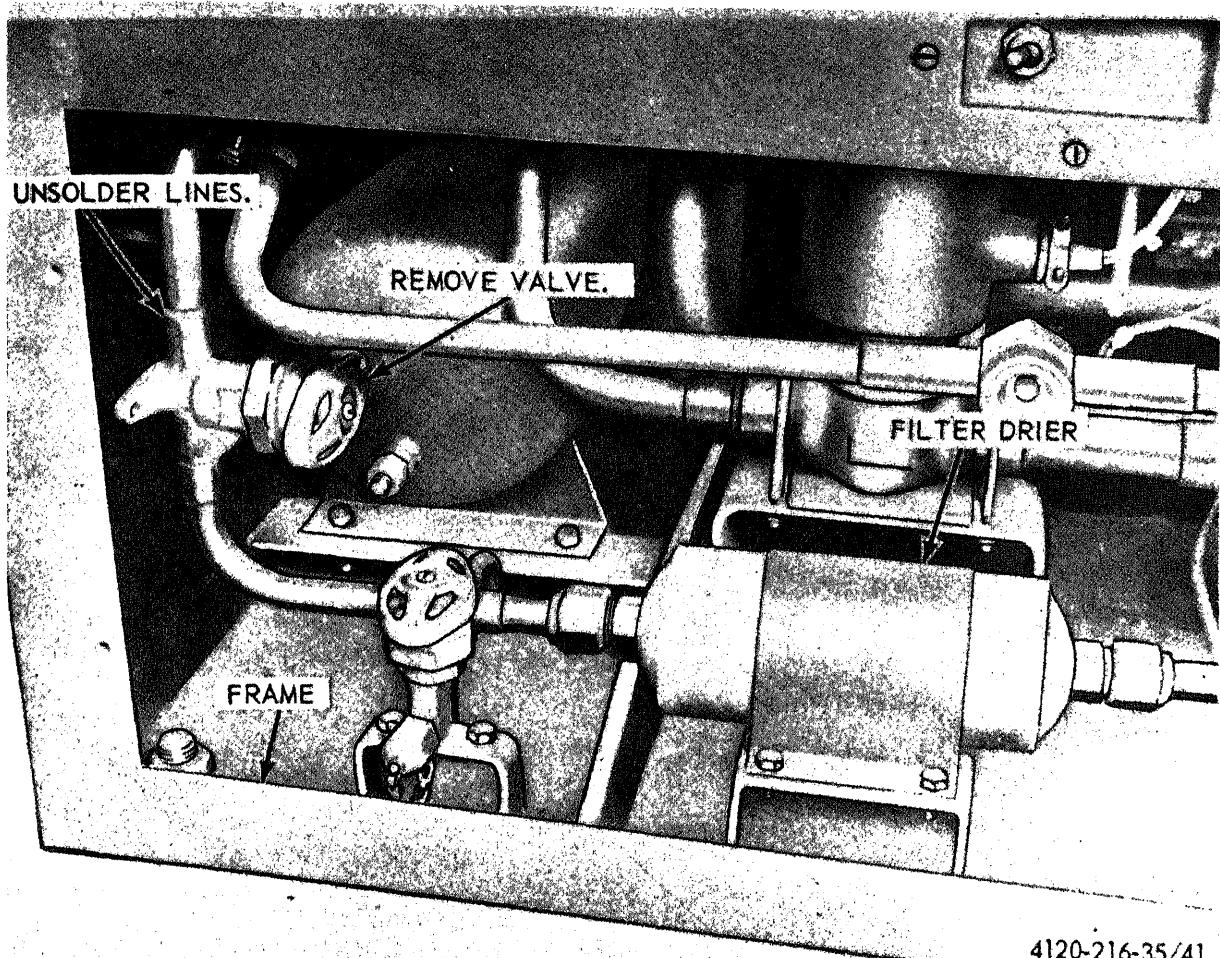
### 6-100. Receiver Shutoff Diaphragm Stop Valve and Tube Installation

a. Install tube and receiver shutoff diaphragm stop valve in reverse of instructions on figure 6-34.

**Warning:** Do not permit solder to get in tubing when installing components. Do not quench heated area.

b. Recharge refrigeration system (para 6-6).

c. Test refrigeration system for leaks (para 6-2).



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Figure 6-34. Receiver shutoff diaphragm stop valve and tube, removal and installation.

## Section XXV. RECEIVER, SAFETY RUPTURE DISK, AND TESTCOCK ASSEMBLIES

### 6-101. General

The receiver is a welded assembly that includes a safety rupture disk and a testcock.

The safety rupture disk will protect the receiver should the assembly overheat. The mounting brackets are part of the receiver.

The receiver stores refrigerant when unit is pumped down or in storage. Both receiver angle valve and inlet diaphragm valves must be opened manually before unit starts operation since the receiver is also a component in the refrigeration system.

#### 6-102. Receiver, Safety Rupture Disk, and Testcock Assemblies Removal

- a. Remove receiver angle shutoff valve and tube (para 6-94).
- b. Remove receiver shutoff diaphragm stop valve and tube (para 6-98) from receiver assembly.
- c. Remove receiver assembly as instructed on figure 6-35.

#### 6-103. Receiver, Safety Rupture Disk, and Testcock Assemblies Cleaning, Inspection, and Repair

- a. *Cleaning.* Clean all parts with an approved solvent and dry thoroughly.
- b. *Inspection.* Inspect all parts for cracks, breaks, nicks, pits, deterioration, and other damage.
- c. *Repair.* Replace an unserviceable receiver.

#### 6-104. Receiver, Safety Rupture Disk, and Testcock Assemblies Installation

- a. Install receiver assembly in reverse of instructions on figure 6-35.
- b. Install receiver shutoff diaphragm stop valve and tube (para 6-100), the receiver angle shutoff valve and tube (para 6-96) on receiver assembly and the refrigeration liquid line tubing.

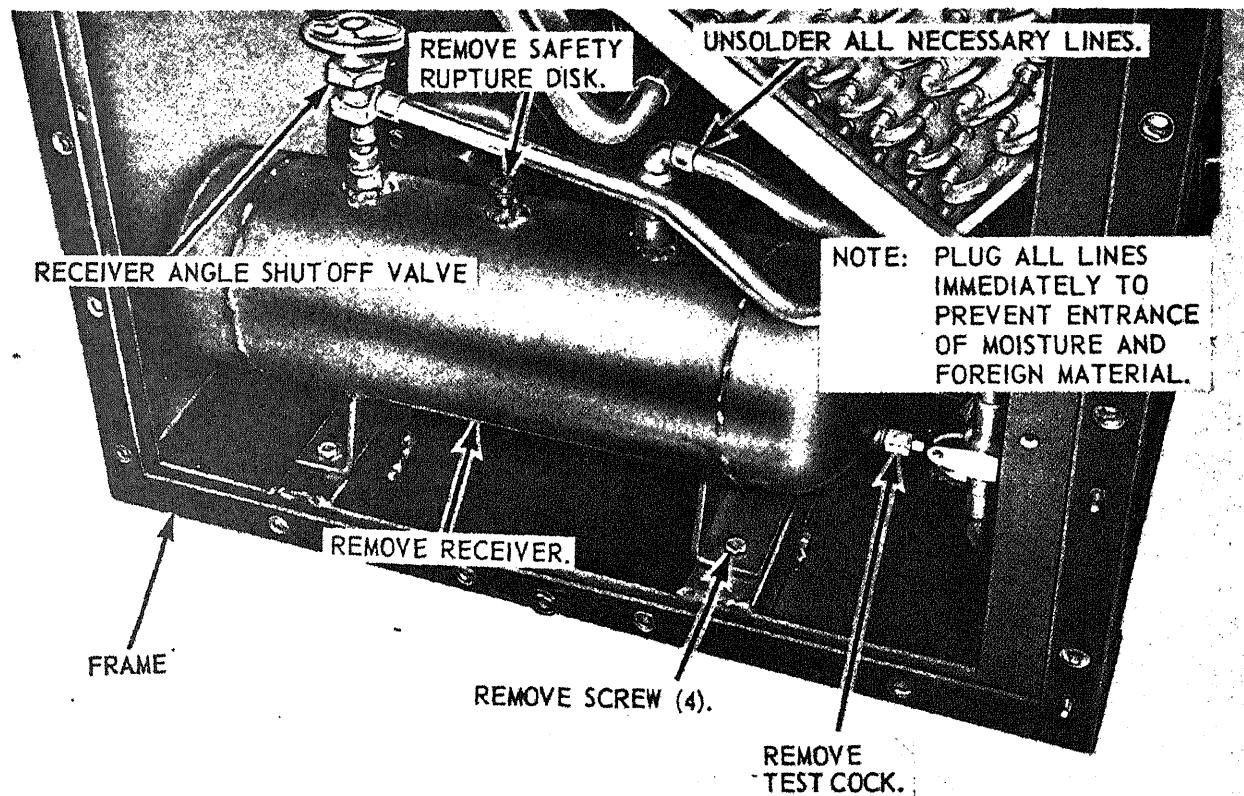


Figure 6-35. Receiver, safety rupture disk, and testcock assemblies, removal and installation.

## Section XXVI. CONDENSER COIL AND TUBES

### 6-105. General

The condenser coil is secured in lower section of frame assembly above condensate section tubes and valves. The hot gas line from compressor is soldered to the coils. The function of the condenser coil is conversion of high pressure gas into a high pressure liquid. The air flowing through the coil removes heat from gas causing the gas to turn to liquid. Proper function of unit is dependent on condenser coil as described in paragraph 3-37.

### 6-106. Condenser Coil and Tubes Removal

Remove condenser coil and tubes from the lower section of frame assembly as instructed in paragraph 5-13.

### 6-107. Condenser Coil and Tubes Cleaning, Inspection, and Repair

*a. Cleaning.* Clean all parts with an approved solvent and dry thoroughly.

*b. Inspection.* Inspect coil, tubes, fittings, mounting hardware, and mounting area for breaks, cracks, dents, deterioration, and other damage.

*c. Repair.* Repair or replace an unserviceable coil and solder all cracks, breaks, or other leaks.

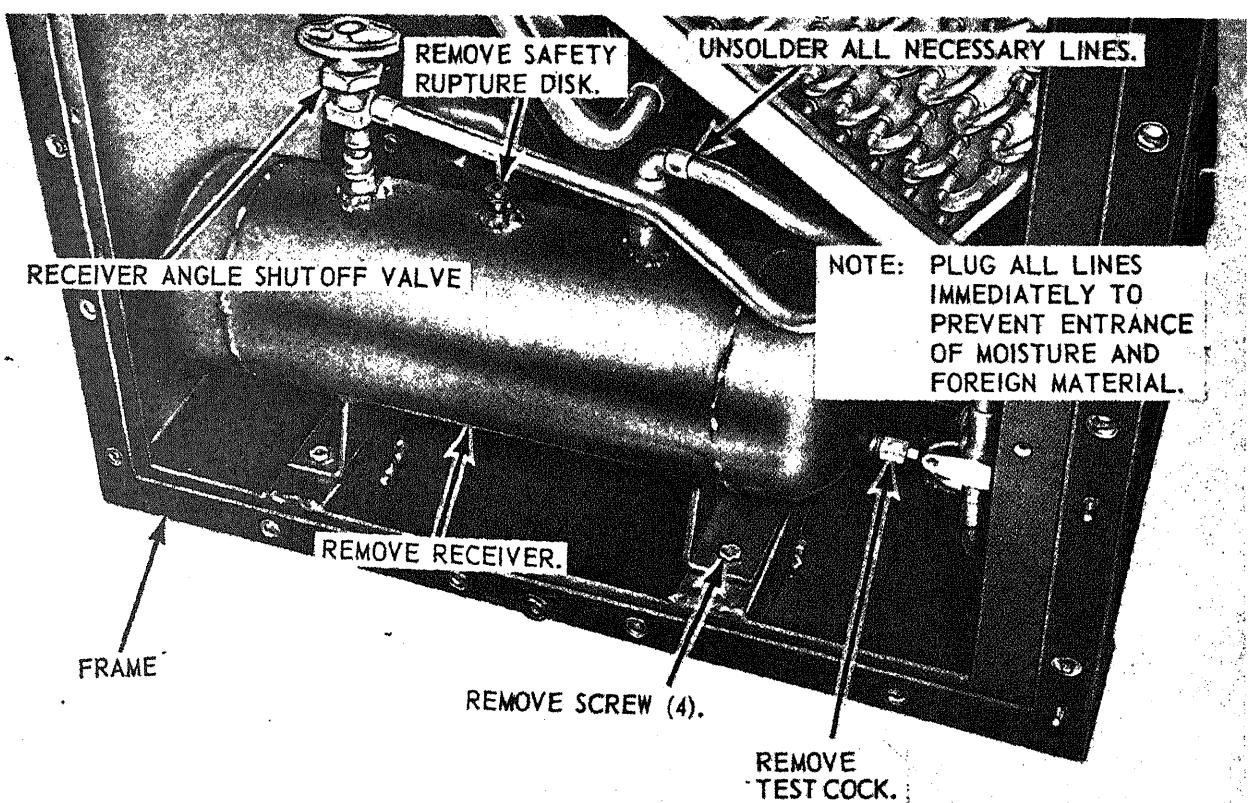
### 6-108. Condenser Coil and Tubes Installation

Install condenser coil and tubes on the lower section of frame assembly as instructed in paragraph 5-13.

The receiver stores refrigerant when unit is pumped down or in storage. Both receiver angle valve and inlet diaphragm valves must be opened manually before unit starts operation since the receiver is also a component in the refrigeration system.

#### 6-102. Receiver, Safety Rupture Disk, and Testcock Assemblies Removal

- a. Remove receiver angle shutoff valve and tube (para 6-94).
- b. Remove receiver shutoff diaphragm stop valve and tube (para 6-98) from receiver assembly.
- c. Remove receiver assembly as instructed on figure 6-35.



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Figure 6-35. Receiver, safety rupture disk, and testcock assemblies, removal and installation.

## Section XXVI. CONDENSER COIL AND TUBES

### 6-105. General

The condenser coil is secured in lower section of frame assembly above condensate section tubes and valves. The hot gas line from compressor is soldered to the coils. The function of the condenser coil is conversion of high pressure gas into a high pressure liquid. The air flowing through the coil removes heat from gas causing the gas to turn to liquid. Proper function of unit is dependent on condenser coil as described in paragraph 3-37.

### 6-106. Condenser Coil and Tubes Removal

Remove condenser coil and tubes from the lower section of frame assembly as instructed in paragraph 5-13.

### 6-107. Condenser Coil and Tubes Cleaning, Inspection, and Repair

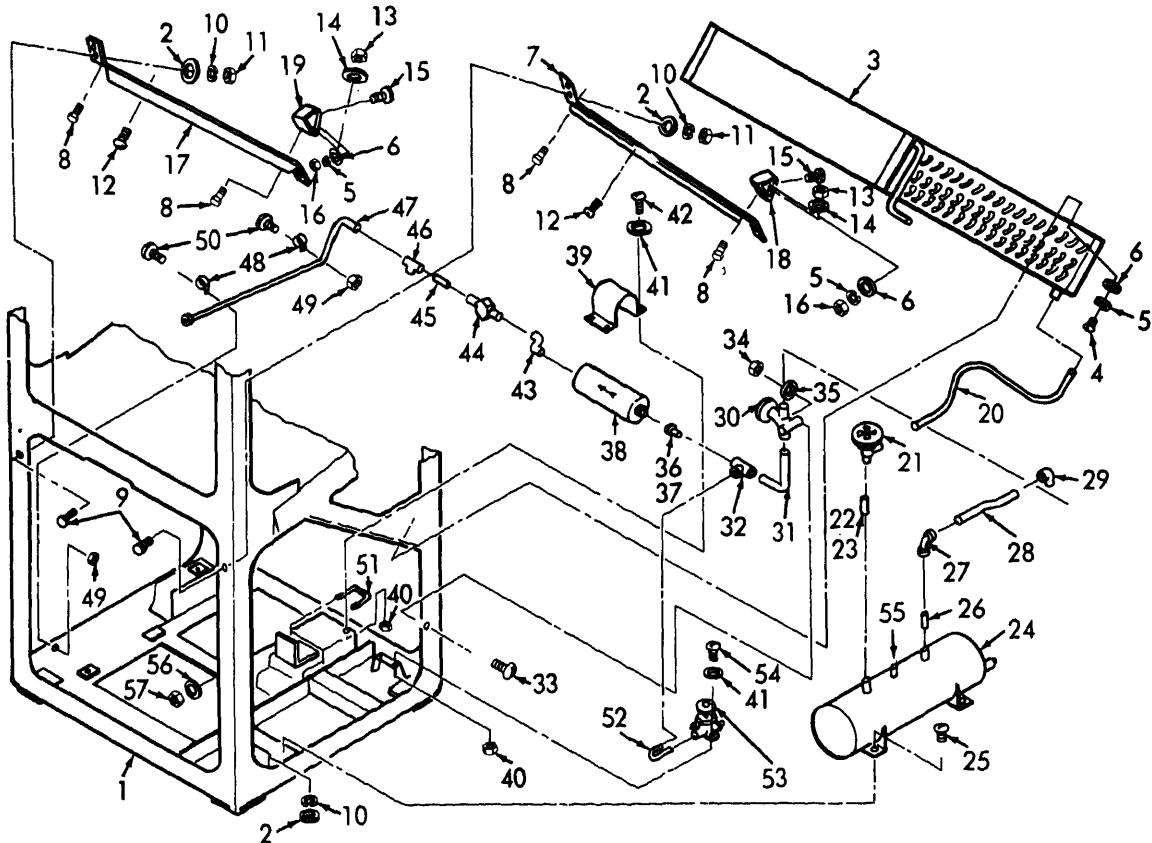
*a. Cleaning.* Clean all parts with an approved solvent and dry thoroughly.

*b. Inspection.* Inspect coil, tubes, fittings, mounting hardware, and mounting area for breaks, cracks, dents, deterioration, and other damage.

*c. Repair.* Repair or replace an unserviceable coil and solder all cracks, breaks, or other leaks.

### 6-108. Condenser Coil and Tubes Installation

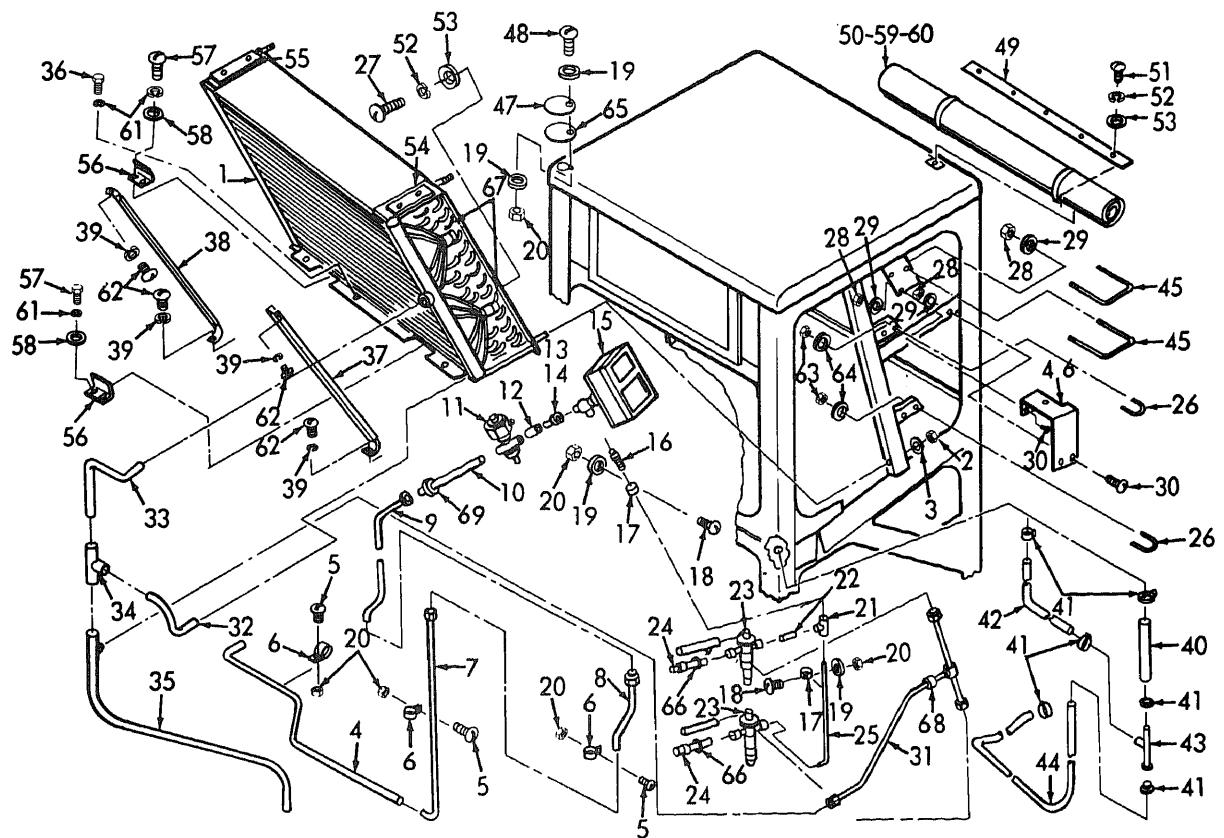
Install condenser coil and tubes on the lower section of frame assembly as instructed in paragraph 5-13.



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|    |                      |    |                        |    |                       |
|----|----------------------|----|------------------------|----|-----------------------|
| 1  | Frame assembly       | 20 | Tube, liquid line      | 39 | Bracket               |
| 2  | Washer, flat (8)     | 21 | Valve, shutoff         | 40 | Nut, shelflocking (4) |
| 3  | Coil, condenser      | 22 | Bushing, flush (1)     | 41 | Washer, flat (4)      |
| 4  | Capscrew (14)        | 23 | Tube (AR)              | 42 | Capscrew (4)          |
| 5  | Washer, lock (4)     | 24 | Receiver, liquid       | 43 | Tube, liquid line     |
| 6  | Washer, flat (4)     | 25 | Capscrew (4)           | 44 | Indicator, liquid     |
| 7  | Support              | 26 | Tube (AR)              | 45 | Tube (AR)             |
| 8  | Bolt (2)             | 27 | Elbow, tube 90°        | 46 | Tee                   |
| 9  | Screw, machine (8)   | 28 | Tube, liquid line      | 47 | Tube, liquid line     |
| 10 | Washer, lock (8)     | 29 | Elbow, tube            | 48 | Clamp, loop           |
| 11 | Nut, selflocking (8) | 30 | Valve, shutoff, outlet | 49 | Nut, selflocking (2)  |
| 12 | Capscrew (1)         | 31 | Tube, liquid line      | 50 | Screw, machine (2)    |
| 13 | Nut, selflocking (2) | 32 | Tee                    | 51 | U-bolt (1)            |
| 14 | Washer, flat (2)     | 33 | Screw, machine (2)     | 52 | Tube, return bend     |
| 15 | Screw, machine (4)   | 34 | Nut, shelflocking (2)  | 53 | Valve, charging       |
| 16 | Nut, selflocking (4) | 35 | Washer, flat (2)       | 54 | Screw, cap (2)        |
| 17 | Support              | 36 | Nipple, flared         | 55 | Plug, fusible         |
| 18 | Bracket              | 37 | Nut, flare (1)         | 56 | Washer, flat (2)      |
| 19 | Bracket              | 38 | Filter-drier           | 57 | Nut, selflocking      |

Figure 6-36 ①. Air conditioner, exploded view.



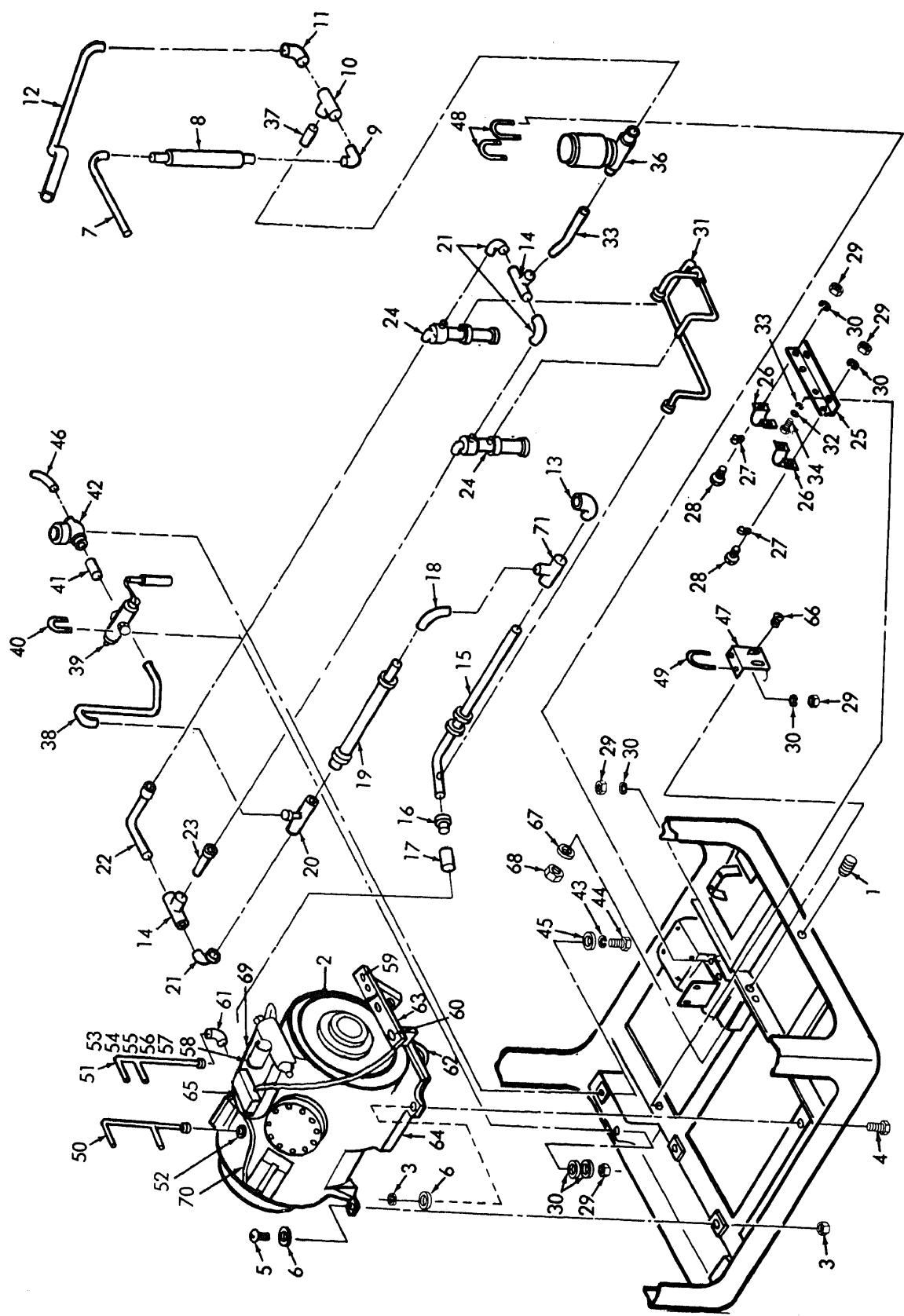
4120-288-15/6-36 (2)

|    |                               |    |                                   |    |                       |
|----|-------------------------------|----|-----------------------------------|----|-----------------------|
| 1  | Coil, evaporator              | 24 | Nipple                            | 47 | Cover (4)             |
| 2  | Nut, selflocking (2)          | 25 | Tube, liquid line                 | 48 | Screw, machine (4)    |
| 3  | Washer, flat (4)              | 26 | U-bolt                            | 49 | Bar                   |
| 4  | Tube, liquid line             | 27 | Capscrew (14)                     | 50 | Canvas cover assembly |
| 5  | Screw, machine (2)            | 28 | Nut, selflocking (4)              | 51 | Screw, machine (5)    |
| 6  | Clamp, loop                   | 29 | Washer, flat (4)                  | 52 | Washer, lock (5)      |
| 7  | Tube, liquid line             | 30 | Capscrew (4)                      | 53 | Washer, flat (5)      |
| 8  | Tube, liquid line             | 31 | Tube assembly, expansion valve    | 54 | Seal, plate           |
| 9  | Tube, liquid line             | 32 | Tube, suction line                | 55 | Seal, plate           |
| 10 | Tube (AR)                     | 33 | Tube, suction line                | 56 | Clip                  |
| 11 | Solenoid valve (KX3)          | 34 | Tee                               | 57 | Screw, hex (4)        |
| 12 | Bushing (1)                   | 35 | Tube, suction line                | 58 | Washer (4)            |
| 13 | Nipple, flared                | 36 | Capscrew (8)                      | 59 | Fastener, snap (22)   |
| 14 | Nut, flared                   | 37 | Support                           | 60 | Fastener, snap (22)   |
| 15 | Valve, motor operated         | 38 | Support                           | 61 | Washer, lock (8)      |
| 16 | Nipple                        | 39 | Washer, lock (22)                 | 62 | Screw, machine (6)    |
| 17 | Clamp, loop                   | 40 | Hose, rubber 1" ID x 7" long (1)  | 63 | Nut, selflocking (2)  |
| 18 | Screw, machine (2)            | 41 | Clamp, hose, low pressure (6)     | 64 | Washer, flat (2)      |
| 19 | Washer, flat (8)              | 42 | Hose, rubber 1" IC x 23" long (1) | 65 | Gasket, cover         |
| 20 | Nut, selflocking (4)          | 43 | Tee                               | 66 | Grommet (2)           |
| 21 | Tee                           | 44 | Hose, rubber 1" IC x 58" long     | 67 | Grommet (2)           |
| 22 | Tube                          | 45 | U-bolt (2)                        | 68 | Grommet               |
| 23 | Valve, thermostatic expansion | 46 | Bracket                           | 69 | Grommet               |

Figure 6-36 (2).—Continued.

4120-288-15/6-36 ③

Figure 6-36 ③.—Continued.



|    |                       |    |  |    |                                       |
|----|-----------------------|----|--|----|---------------------------------------|
| 1  | Plug, pipe (4)        | 20 | Tube, hot gas line                     | 37 | Tube, liquid and gas line             |
| 2  | Compressor assembly   | 21 | Elbow, tube                            | 38 | Valve, thermostatic expansion         |
| 3  | Nut, selfflocking (4) | 22 | Tube, hot gas line                     | 39 | Screw, machine (8)                    |
| 4  | Bolt, machine (2)     | 23 | Tube, hot gas line                     | 40 | Nut, selfflocking (8)                 |
| 5  | Screw, machine (2)    | 24 | Valve, constant pressure expansion (2) | 41 | Wiring harness, connector J19 and J20 |
| 6  | Washer, flat (4)      | 25 | Angle Bracket (2)                      | 42 | Tube                                  |
| 7  | Tube, hot gas (1)     | 26 | Brace (2)                              | 43 | Solenoid valve (KX2)                  |
| 8  | Hose, flexible        | 27 | Clamp, loop                            | 44 | Washer, lock (2)                      |
| 9  | Elbow, 90°            | 28 | Screw, machine (4)                     | 45 | Screw, hex head (2)                   |
| 10 | Tee                   | 29 | Nut, selfflocking (6)                  | 46 | Washer, flat (2)                      |
| 11 | Elbow, tube 90°       | 30 | Washer, flat (6)                       | 47 | Elbow                                 |
| 12 | Tube, hot gas         | 31 | Tube assembly, hot gas bypass          | 48 | Heater                                |
| 13 | Elbow, tube 90°       | 32 | valve                                  | 49 | Heater                                |
| 14 | Tee                   | 33 | Washer, lock (2)                       | 50 | Heater                                |
| 15 | Tube suction line     | 34 | Washer, flat (2)                       | 51 | Heater                                |
| 16 | Reducer, tube         | 35 | Bolt (2)                               | 52 | High pressure                         |
| 17 | Tube                  | 36 | Tube, hot gas line                     | 53 | Low pressure                          |
| 18 | Elbow, 90°            |    | Solenoid valve (KXI)                   | 54 | Machine                               |
| 19 | Hose, flexible        |    |  | 55 | Machine                               |
|    |                       |    |  | 56 | Machine                               |
|    |                       |    |  | 57 | Machine                               |
|    |                       |    |  | 58 | Machine                               |

Figure 6-36 ③—Continued.

## **APPENDIX A**

### **REFERENCES**

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#### **A-1. Lubrication**

C9100-IL                    Fuels, Lubricants, Oils and Waxes.

#### **A-2. Maintenance**

TM 5-764                    Electric Motor and Generator Repair.  
TM 5-4120-288-25P            Organizational, Direct and General Support and Depot Repair  
                                  Parts.  
TM 9-213                    Painting Instructions for Field Use.  
TM 38-750                    Army Equipment Record Procedures.

#### **A-3. Radio Interference Suppression**

TM 11-483                    Radio Interference Suppression.

#### **A-4. Preservation and Packaging**

TM 38-230                    Preservation, Packaging and Packing of Military Supplies and  
                                  Equipment.

## APPENDIX B

### BASIC ISSUE ITEMS LIST

#### Section I. INTRODUCTION

##### B-1. Scope

This appendix lists items which accompany the air conditioner or are required for installation, operation, or operator's maintenance.

##### B-2. General

*Basic Issue Items—Section II.* This section is a listing of accessories, repair parts, tools, and publications required for operator's maintenance and operation, initially issued with, or authorized for the air conditioner.

##### B-3. Explanation of Columns

The following provides an explanation of columns in the tabular list of Basic Issue Items, Section II:

###### a. Source, Maintenance, and Recoverability Codes (SMR), Column 1:

(1) Source Code indicates the selection status and source for the listed item. Source codes are:

| Code | Explanation   |
|------|---|
| P    | Applied to repair parts which are stocked in or supplied from GSA/DSA Army supply system, and authorized for use at indicated maintenance categories. |

X2—Applied to repair parts which are not stocked. The indicated maintenance category requiring such repair parts will attempt to obtain them through cannibalization; if not obtainable through cannibalization, such repair parts will be requisitioned with supporting justification through normal supply channels.

(2) Maintenance Code indicates the lowest category of maintenance authorized to install the listed item. The maintenance level code is:

| Code | Explanation   |
|------|---------------|
| C    | Operator/crew |

b. *Federal Stock Number, Column 2.* This column indicates the Federal stock number for the item.

c. *Description, Column 3.* This column indicates the Federal item name and any additional description required. A five-digit manufacturer's or other service code is shown in parentheses followed by the manufacturer's part number. Repair parts quantities included in kits, sets, and assemblies that differ from the actual quantity used in the specific item, are listed in parentheses following the repair part name.

d. *Unit of Issue, Column 4.* This column indicates the unit used as a basis of issue, e.g., ea, pr, ft, yd, etc.

e. *Quantity Incorporated in Unit Pack, Column 5.* This column indicates the actual quantity contained in the unit pack.

f. *Quantity Incorporated in Unit, Column 6.* This column indicates the quantity of the item used in the equipment.

g. *Quantity Furnished With Equipment, Column 7.* This column indicates the quantity of an item furnished with the equipment in excess of the quantity incorporated in the unit.

h. *Quantity Authorized, Column 8.* This column indicates the quantity of an item authorized the operator/crew to have on hand or to obtain as required. As required items are indicated with an asterisk.

i. *Illustration, Column 9.* This column is divided as follows:

(1) Figure Number, Column 9a, indicates the figure number of the illustration in which the item is shown.

(2) Item Number, Column 9b, indicates the callout number used to reference the item in the illustration.

**B-4. Federal Supply Code**

*Code* 97403 *Manufacturer* Army Engineer Research and Development Laboratory, Fort Belvoir, Va.

## Section II. BASIC ISSUE ITEMS LIST

| (1)<br>Source, maint. and<br>Recov code | (2)<br>Federal<br>stock no. | (3)<br>Description   | (4)      |          | (6)<br>Qty<br>inc<br>in<br>unit<br>pack | (7)<br>Qty<br>furn<br>with<br>equip | (8)                              |                    | (9)<br>Illustration |
|---|-----------------------------|--|----------|----------|---|-------------------------------------|----------------------------------|--------------------|---------------------|
|   |                             |  | (A)<br>S | (B)<br>M | (C)<br>R                                |                                     | (A)<br>Qty<br>Per<br>Unit<br>No. | (B)<br>Item<br>No. |                     |
| P C                                     | 7520-559-9618               | GROUP 31—Basic Issue Items, Manufacturer Installed<br>3100—Basic Issue Items Manufacturer or Depot Installed<br>CASE, MAINTENANCE AND OPERATIONAL MAN-<br>UALS: cotton duct, water repellent, mildew.<br>DEPARTMENT OF THE ARMY, OPERATOR, ORGAN-<br>IZATIONAL, DIRECT AND GENERAL SUPPORT<br>AND DEPOT MAINTENANCE MANUAL TM 5-4120-<br>288-15. |          |          |   |                                     | 1                                | 1                  |                     |
| X2 C                                    |                             | ORGANIZATIONAL, DIRECT AND GENERAL SUP-<br>PORT, AND DEPOT MAINTENANCE REPAIR PARTS<br>AND SPECIAL TOOL LIST TM 5-4120-288-26P.  |          |          |   |                                     | 1                                | 1                  |                     |
| X2 C                                    |                             | GROUP 32—BASIC ISSUE ITEMS, TROOP INSTALLED,<br>TROOP INSTALLED OR AUTHORIZED  |          |          |   |                                     | 1                                | 1                  |                     |
| X2 C                                    |                             | CABLE ASSY., CONTROL (97403) 13211E 3847   |          |          |   |                                     | 1                                | 1                  |                     |
| X2 C                                    |                             | CABLE ASSY., POWER (97403) 13211E 3860   |          |          |   |                                     | 1                                | 1                  |                     |
| X2 C                                    |                             | CONTROL, REMOTE, PANEL ASSY. (97403) 13211E 4139   |          |          |   |                                     | 1                                | 1                  |                     |

## APPENDIX C

### MAINTENANCE ALLOCATION CHART

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#### Section I. INTRODUCTION

##### **C-1. General**

*a.* This section provides a general explanation of all maintenance and repair functions authorized at various maintenance levels.

*b.* Section II designates overall responsibility for the performance of maintenance functions on the identified end item or component. The implementation of the maintenance functions upon the end item or component will be consistent with the assigned maintenance functions.

*c.* Section III lists the special tools and test equipment required for each maintenance function as referenced from Section II.

*d.* Section IV contains supplemental instructions, explanatory notes and/or illustrations required for a particular maintenance function.

##### **C-2. Explanation of Columns in Section II**

*a. Group Number. Column 1.* The functional group is a numerical group set up on a functional basis. The applicable functional grouping indexes (obtained from TB 750-93-1, Functional Grouping Codes) are listed on the MAC in the appropriate numerical sequence. These indexes are normally set up in accordance with their function and proximity to each other.

*b. Functional Group. Column 2.* This column contains a brief description of the components of each functional group.

*c. Maintenance Functions. Column 3.* This column lists the various maintenance functions (A through K) and indicates the lowest maintenance category authorized to perform these

functions. The symbol designations for the various maintenance categories are as follows:

C—Operator or crew  
O—Organizational maintenance  
F—Direct support maintenance  
H—General support maintenance  
D—Depot maintenance

The maintenance functions are defined as follows:

- A—INSPECT** To determine serviceability of an item by comparing its physical, mechanical, and electrical characteristics with established standards.
- B—TEST** To verify serviceability and to detect electrical or mechanical failure by use of test equipment.
- C—SERVICE** To clean, to preserve, to charge, to paint, and to add fuel, lubricants, cooling agents, and air.
- D—ADJUST** To rectify to the extent necessary to bring into proper operating range.
- E—ALINE** To adjust specified variable elements of an item to bring to optimum performance.
- F—CALIBRATE** To determine the corrections to be made in the readings of instruments or test equipment used in precise measurement. Consists of the comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the accuracy of the instrument being compared with the certified standard.
- G—INSTALL** To set up for use in an operational environment such as an emplacement, site, or vehicle.
- H—REPLACE** To replace unserviceable items with serviceable assemblies, subassemblies, or parts.
- I—REPAIR** To restore an item to serviceable condition. This includes, but is not limited

to, inspection, cleaning, preserving, adjusting, replacing, welding, riveting, and strengthening.

**J—OVERHAUL** To restore an item to a completely serviceable condition as prescribed by maintenance serviceability standards using the Inspect and Repair Only as Necessary (IROAN) technique.

**K—REBUILD** To restore an item to a standard as nearly as possible to original or new condition in appearance, performance, and life expectancy. This is accomplished through complete disassembly of the item, inspection of all parts or components, repair or replacement of worn or unserviceable elements (items) using original manufacturing tolerances and specifications, and subsequent reassembly of the item.

*d. Tools and Equipment. Column 4.* This column is provided for referencing by code the special tools and test equipment, (sect. III) required to perform the maintenance functions (sect. II).

*e. Remarks. Column 5.* This column is provided for referencing by code the remarks (sect. IV) pertinent to the maintenance functions.

### **C-3. Explanation of Columns in Section III**

*a. Reference Code.* This column consists of

a number and a letter separated by a dash. The number references the T&TE requirements column on the Maintenance Assignment. The letter represents the specific maintenance function the item is to be used with. The letter is representative of columns A through K on the Maintenance Assignment.

*b. Maintenance Level.* This column shows the lowest level of maintenance authorized to use the special tool or test equipment.

*c. Nomenclature.* This column lists the name or identification of the tool or test equipment.

*d. Tool Number.* This column lists the manufacturer's code and part number, or Federal stock number of tools and test equipment.

### **C-4. Explanation of Columns in Section IV**

*a. Reference Code.* This column consists of two letters separated by a dash, both of which are references to Section II. The first letter references column 5 and the second letter references a maintenance function, column 3, A through K.

*b. Remarks.* This column lists information pertinent to the maintenance function being performed, as indicated on the Maintenance Assignment, Section II.

## Section II. MAINTENANCE ASSIGNMENT

| (1)<br>Group Number | (2)<br>Functional group                                    | (3)<br>Maintenance Functions |   |   |   |   |   |   |     | (4)<br>Tools and Equipment | (5)<br>Remarks |
|---------------------|--|------------------------------|---|---|---|---|---|---|-----|----------------------------|----------------|
|                     |  | A                            | B | C | D | E | F | G | H   |                            |                |
| 15<br>1501          | FRAME, TOWING ATTACHMENTS, AND DRAWBARS<br>Frame Assembly  | C                            | C | C | C | C | C | C | C   | O O                        |                |
|                     | Adapter, Tiedown   |                              |   |   |   |   |   |   |     | F F                        |                |
|                     | Box, support receptacles                                   |                              |   |   |   |   |   |   |     | F F                        |                |
|                     | Brace, support control box                                 |                              |   |   |   |   |   |   |     | F F                        |                |
|                     | Bracket, fresh air door                                    |                              |   |   |   |   |   |   |     | O O                        |                |
|                     | Bracket, condenser coil and valve mtg                      |                              |   |   |   |   |   |   |     | F                          |                |
| 18<br>1801          | BODY, CAB, HOOD, HULL<br>Body, Cab, Hood, Hull Assemblies  | C                            | C | C | C | C | C | C | C   | O O                        |                |
|                     | Panels   |                              |   |   |   |   |   |   |     | O O                        |                |
|                     | Plates, grills, damper                                     |                              |   |   |   |   |   |   |     | O O                        |                |
| 22<br>2201          | ACCESSORY ITEMS<br>Canvas Items                            | C                            | C | C | C | C | C | C | C   | O O                        |                |
| 2207                | Winterization Equipment                                    |                              |   |   |   |   |   |   |     | O O                        |                |
|                     | Heater, compressor   |                              |   |   |   |   |   |   |     | F F                        |                |
| 2210                | Data Plates  | C                            | O | C | C | C | C | C | C   | F F                        |                |
|                     | Plate, data  |                              |   |   |   |   |   |   |     | F F                        |                |
|                     | Plates, caution and instruction                            |                              |   |   |   |   |   |   |     | O O                        |                |
| 40                  | ELECTRIC MOTORS AND GENERATORS                             |                              |   |   |   |   |   |   |     | F F                        |                |
| 4000<br>4006        | Motor Assemblies<br>Starting and Protective Devices        | C                            | F | C | F | C | F | C | O O | F F                        |                |
|                     | Relays   |                              |   |   |   |   |   |   |     | F F                        |                |
|                     | Heaters  |                              |   |   |   |   |   |   |     | O O                        |                |
|                     | Switches   |                              |   |   |   |   |   |   |     | F F                        |                |
|                     | Contactors   |                              |   |   |   |   |   |   |     | F F                        |                |
|                     | Reset Control  |                              |   |   |   |   |   |   |     | O O                        |                |
| 4009                | Control Panels, Housing, Cubicles                          | C                            | C | C | C | C | C | C | C   | F F                        |                |
|                     | Box, control   | O                            | O | O | O | O | O | O | O   | F F                        |                |
| 4010                | Master or Auxiliary Control Assembly<br>Remote control box | C                            | C | C | C | C | C | C | C   | F F                        |                |
|                     | Lamp   |                              |   |   |   |   |   |   |     | O O                        |                |
|                     | Light assembly   |                              |   |   |   |   |   |   |     | F F                        |                |
|                     | Circuit breaker  |                              |   |   |   |   |   |   |     | F F                        |                |
|                     | Potentiometer  |                              |   |   |   |   |   |   |     | F F                        |                |



|      |                       |  |
|------|-----------------------|--|
| B230 | Condenser             |  |
|      | Coil, condenser       |  |
| B241 | Evaporator            |  |
|      | Coil, evaporator      |  |
|      | Condensate drain      |  |
| 5243 | Blower Assembly       |  |
|      | Belts, blower         |  |
|      | Thermostatic Controls |  |
|      | Transmitter           |  |
| 5244 | Air filters           |  |
| 5245 |                       |  |

### Section III. SPECIAL TOOL AND SPECIAL TEST EQUIPMENT REQUIREMENTS

| Reference code | Maintenance level | Nomenclature                                | Tool number |
|----------------|-------------------|---|-------------|
|                |                   | No special tool or test equipment required. |             |

### Section IV. REMARKS

| Reference code | Remarks                                      |
|----------------|--|
| A—A            | Inspection includes micrometer measurements. |

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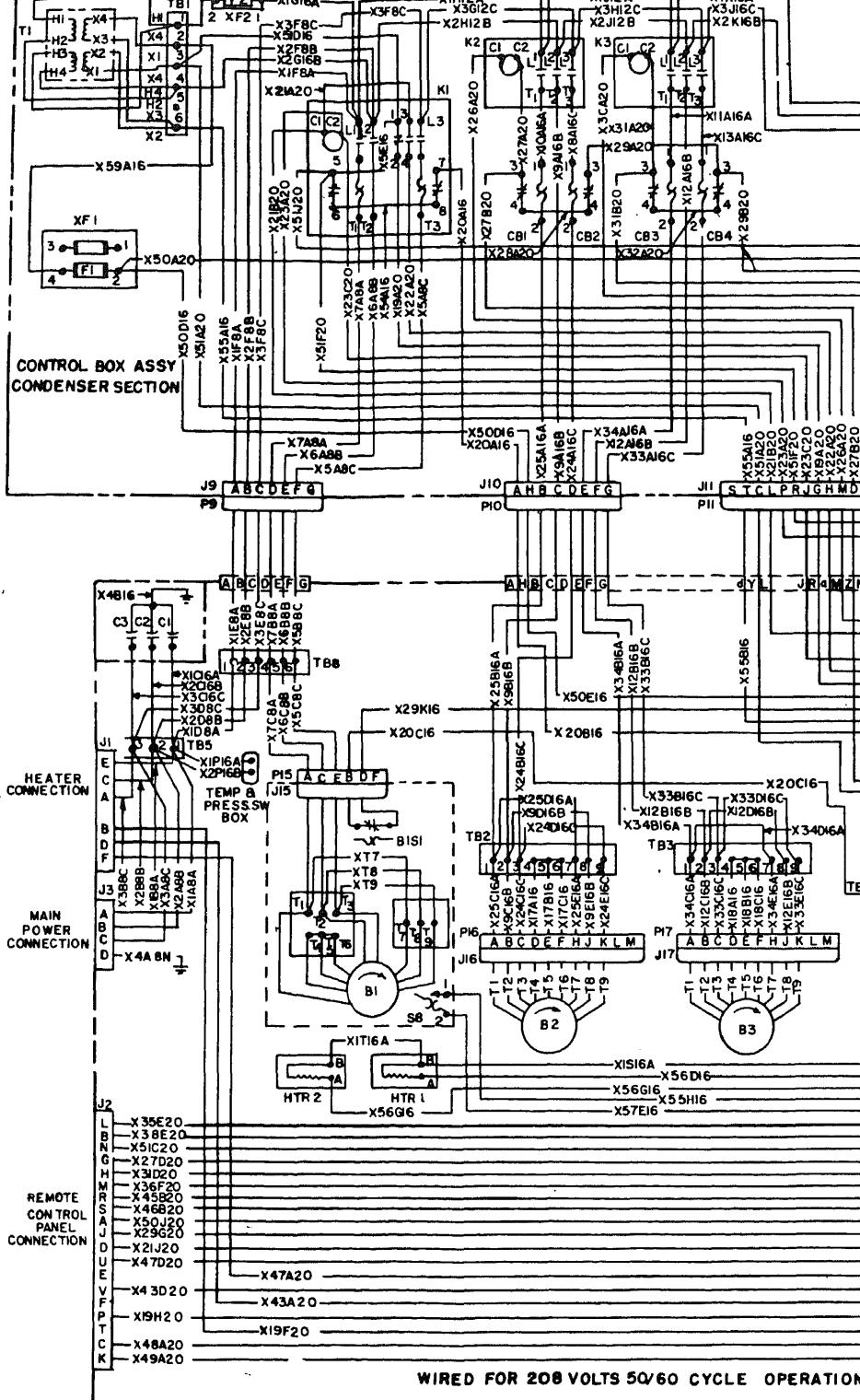
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WIRED FOR 208 VOLTS 50/60 CYCLE OPERATION